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MEMOIRS
OF THE
CARNEGIE MUSEUM
VOLUME XII

THE EXPLORATION OF SOUTHAMPTON ISLAND, HUDSON BAY

By GEORGE MIKSCH SUTTON

SPONSORED BY MR. JOHN BONNER SEMPLE

1929-1930



PITTSBURGH
PUBLISHED BY THE AUTHORITY OF THE BOARD OF TRUSTEES OF THE
CARNEGIE INSTITUTE
MARCH 1932-OCTOBER 1936

PREFATORY NOTE

With this prefatory material, the Twelfth Volume of the Memoirs of the Carnegie Museum is complete and no additional parts are to be issued. This volume has been devoted exclusively to the publication of the results of "The Exploration of Southampton Island, Hudson Bay, by George Miksch Sutton." When it was started, it was not possible to determine how many separate articles were to be included. Accordingly a rather unsatisfactory arrangement of the constituent papers into Sections and Articles was developed and this has been further complicated by the separate pagination of the various papers. Because of this lack of continuous pagination, it has not been considered feasible to provide a final index to the complete volume.

A separate index to each Part, however, has been provided. Part I, originally issued without an index, was subsequently furnished with one which should be bound at the end, while Parts II and III were each provided with an index which appeared bound in at its proper place, with the final paper of each of these Parts.

Careful attention should be given to the "Arrangement of constituent papers," which follows, by which it may be determined if all of the constituent parts properly pertaining to this volume, but issued separately, have been brought together without omissions.

THE EDITORS

Carnegie Museum
October 1, 1936

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By GEORGE MIKSCH SUTTON

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W. J. HOLLAND, Editor

THE EXPLORATION OF SOUTHAMPTON ISLAND, HUDSON BAY

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SECTION 1, PREFATORY; SECTION 2, INTRODUCTORY;
SECTION 3, BIBLIOGRAPHY OF PART I AND PART II, SECTION 2.

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THE EXPLORATION OF SOUTHAMPTON ISLAND

SECTION 1— PREFATORY

REASONS FOR UNDERTAKING THE STUDY

BY GEORGE MIKSCH SUTTON

Many an explorer, eager to add a little to what we call the sum of human knowledge, or dreaming of wealth and fame, has sailed the polar seas. Many a scientist has fought his way across tundra and through ice-fields hoping to conquer and dispel the apparent inscrutability of the frozen ocean, the ice-covered wastes, and the aurora-curtained sky. Many a bird-lover, ashamed that we should know so little about the nesting-habits of some of our common migrant species, has made his way to the inhospitable Barren Grounds, or to the remote Arctic islands, confident of finding there in their summer homes creatures, whose domain is the wide world itself, and whose seasonal flights take them indeed "from zone to zone." All these, explorers, scientists, and bird-lovers, acknowledge the charm of the Far North; but none can precisely explain it. One finds one's self while in the Arctic wondering why one should leave a pleasant home for such a cold and savage land, and how, indeed, any race of beings, be they ever so rugged, can continue to remain there. One leaves the Arctic wondering whether one can again resume the noisy intricacies of the over-organized civilization, to which one must return. Safe home from the northern seas, one recoils a little at the thought of winter-long isolation, of frozen face and hands, of insufficiency of food; but one finds one's self dreaming, nevertheless, of returning some day to the magnificent, unquestioning, impersonal friendliness of the tundra.

I went to Southampton Island partly because, more than once having been under the spell of the clean-edged beauty of the Arctic, I felt that I must return. In the year 1920, through the kindness of Mr. W. E. Clyde Todd, Curator of Ornithology at the Carnegie Museum, I had the opportunity of studying the Labrador coast from Battle Harbor to Cape Chidley as a member of one of the expeditions of the Carnegie Museum. I was wofully untrained for work in the field, but Mr. Todd was patient, even indulgent. Not only did I learn a great deal from him about field technique, but I caught from him some of that deep interest in zoögeographical problems and in the study of life-histories, which has taken him back year after year to the mighty wildernesses of the Labrador Peninsula.

During subsequent years I was fortunate enough to be included in the expeditions both of Mr. Todd and Mr. John Bonner Semple down the Abitibi and Missinaibi Rivers. Finally in 1926 I traversed in canoe with these two gentlemen the entire eastern coast of Hudson Bay from Moose Factory to Richmond Gulf, and thence went in schooners of the Revillon Frères Trading Company to Port Harrison and Cape Wolstenholme.

All these journeys were made in mid-summer, since it was impossible to navigate the ice-filled waters earlier in the season. We of course encountered many interesting species of Arctic birds, but our contacts with them were tantalizingly brief. We reached their breeding-grounds so late that we almost never witnessed any antics of courtship. We had no chance to watch the building of nests, and collected but few eggs. Often the birds were in that silent, bedraggled stage, which follows the nesting season. Flocks of young in juvenal plumage were indeed interesting, and unusual birds, whether in perfect feather or not, were sure to be thrilling when studied in their remote habitat, but I found myself over and over again saying to myself, as I collected, or made sketches of buntings, longspurs, loons, and shore-birds: "I must see these birds during their nesting season; I must witness their arrival in the spring; I must watch them mate and build their nests; I must see them depart for the south in the fall; in short, I must somehow live their Arctic life with them, if I am really to know and understand them, and if I am to make pictures which accurately and sympathetically record their postures and facial expression."

A year in the Arctic! How should I get there? Just where should I go? On the expedition of 1926, Mr. Semple and I had had opportunity to discuss such questions, since, owing to the loss of the propeller of the *Albert Revillon* our trip from Cape Wolstenholme to Montreal, via Fort Chimo in Ungava Bay, was considerably prolonged. Even at that time there was lodged in the back of my mind the hope that I might undertake a biological survey of Southampton Island.

It was not, however, until the summer of 1928 that I definitely decided upon Southampton as the objective of my expedition. While returning on the steamer *North Shore* from a study of the bird-life of the Gulf of Saint Lawrence, I had the pleasure of meeting Mr. Ralph Parsons and Mr. Sam G. Ford, both of the Hudson's Bay Company, who joined in expressing the belief that residence for a year at Southampton would be possible. The Company had established a Post on the Island in 1924, and Mr. Ford himself was the Factor. When this gentleman told me of the birds he had seen, of the nests he had found, of the natives with whom he had lived, and finally of the pleasure he would have in helping me personally in my study of the avifauna of "our Island," my enthusiasm mounted to a high pitch. Finally when Mr. Parsons, at that time the District Manager of the Saint Lawrence-Labrador District, expressed his belief that the Company would agree to my establishing headquarters at their Post, and would help me in all possible ways, I decided then and there that I would go to Southampton during the following summer, to remain there for a year.

I found that but little scientific work had been done on the great Island. Though some collections had been made, these were not by any means fully representative. Certain parts of the shore-line were not even properly charted. Virtually nothing was known about the southeastern part of the Island, some of which apparently had not been visited by white men since the days of Button and Baffin. The more I sought for literature, dealing with the fauna, flora, or geology of the island, the more fully convinced I became that the great territory needed to be studied. Furthermore I thought my study would be valuably supplementary to Mr. Todd's thorough work in the Labrador Peninsula, and to Mr. Edward

A. Preble's survey of the Hudson Bay Region which, extensive as it had been, had scarcely touched Southampton Island. Then too Mr. Percy A. Taverner, who during recent years had been making such important and welcome contributions to our knowledge of the bird-life of British America, assured me that a study of Southampton Island was needed before the distribution and migratory movements of certain birds could properly be understood.

Mr. Ford's statement that native Eskimos had known for years of a nesting colony of Blue Geese at Cape Kendall, on the western side of Southampton, gave me a definite objective from the first. Whatever else I might accomplish, I felt that at least I might substantiate the reports of the natives concerning these geese, by myself journeying to Cape Kendall. At this time, Mr. Dewey Soper had not yet succeeded in locating the breeding-grounds of this bird in Baffin Island, so the definite summer range of the species was yet to be discovered.

My plans soon began to take definite form. I would reach Southampton on the Hudson Bay Company's supply-boat, the *Nascopie*; I would live, when in the vicinity of the Post, with Mr. Ford himself; the Company would do all in their power to help me. When I had arranged for permits, planned my equipment thoroughly, and made such adjustments as were necessary in leaving home for a year, I was ready for the great adventure.

ACKNOWLEDGMENTS

My first word of thanks is to Mr. John Bonner Semple, of Sewickley, Pennsylvania, Trustee of the Carnegie Institute, the gentleman who made my expedition possible. Not only did Mr. Semple give me all the financial support I needed for my enterprise, but he personally examined all my equipment, especially the fire-arms and ammunition, designed and constructed my auxiliary collecting barrels, furnished me with articles of trade for the Eskimos, and in every way possible made my departure and return pleasant.

The officials and representatives of the Hudson's Bay Company, who assisted me in many ways, were uniformly courteous and considerate. The Company permitted me to establish headquarters at their Southampton Post; they ordered many of my supplies; and they were most attentive to my problems. From the very outset I had the feeling that they were genuinely interested in the success of my undertaking. This interest was, and is, a modern expression of the pioneer spirit, which led those famous gentlemen of far-gone years, into their various adventurings into Hudson Bay. Mr. Ralph Parsons and Mr. James Cantley, who arranged for my passage on the *Nascopie*, were most gracious. Mr. William Ritchie, who saw that my luggage was properly taken to Southampton, and who watched over the eighteen ponderous chests and barrels of specimens on their long journey out, was efficient and careful. My especial thanks are due Mr. Ritchie for the manner in which he cared for this shipment in Newfoundland, where it was necessary to reload it upon a steamer bound for New York. Mr. Hugh Conn, General Inspector, generously gave me a passage on his neat little motor-yacht *Nowya* from Chesterfield Inlet south to Churchill during the summer of 1930, thereby enabling me to reach home much earlier than I could have done, had I remained on the *Nascopie*. Mr. George Watson, who greeted me at Southampton after my eventful sojourn, and who arranged for my return to civilization, was a gentleman whose quiet friendliness impressed me instantly.

The various Chief Traders or Post Factors, with whom I came into contact on my way south along the west coast of Hudson Bay, were all most hospitable. Mr. S. J. ("Lofty") Stewart, at Chesterfield, Mr. Sam Voisey, at Tavane (Mistake Bay), and Mr. L. Williamson,

at Churchill, all somehow succeeded in making me feel genuinely welcome. Then there were the men on the *Nascopie*: Captain John Murray, who regaled me with recollections of his experiences on and about Southampton; Mr. Fred W. Berchem, Mate, who saw that my shipments were properly covered in the hold; Dr. W. J. K. Clothier, who gave me some medicines, which fortunately I did not need to use; Chief Engineer John Leddingham, Mr. Hardwick, Mr. Reed, the Chief Steward, and others. By the time I had become acquainted with all these men I began to feel that my study of Southampton Island was one of the activities of the great Company itself; that I was in some pleasant way connected with them in their work of understanding, helping, and harnessing the tremendous wilderness of "the North Country."

The officials of the Canadian Government at Ottawa, who procured for me various permits for collecting natural history specimens, were very courteous. Among these men were Mr. O. S. Finnie, Director of the North West Territories and Yukon Branch of the Department of the Interior; Mr. J. B. Harkin, Director of the Canadian Parks Branch of the Department of the Interior; Mr. Hoyes Lloyd, Supervisor of Wild Life Protection for the Department; Dr. R. M. Anderson, Chief of the Division of Biology of the Canadian National Museum; and Mr. Percy A. Taverner, Chief of the Division of Ornithology of the Museum. Dr. Anderson was especially helpful in giving me references as to reports on the various explorations which had been made on and about Southampton, and Mr. Taverner has been most painstaking in helping me in the preparation of the present manuscript, in checking identifications, loaning material, and permitting the use of his own data.

I could have made little progress at Southampton without the help of my good friend Mr. Sam Ford, Chief Trader of the Hudson's Bay Company, with whom I lived while at the Post at Coral Inlet. At the first word of greeting from Sam Ford I knew he and I would be friends. He told the Eskimos what I wanted and labored heroically at interpreting for them my involved scientific discourses. He went with me to Cape Low, and helped in all sorts of ways, in managing the motor-boat, in cooking meals, and in shooting specimens. Sometimes I think that Amaulik Audlanat and I actually owe our lives to Sam Ford; for had he not on our trip to Cape Low somehow kept himself from becoming seasick on a certain stormy day, we three men might have drifted to Coats Island in our damaged boat, never to return. I have no desire to make these dangers appear graver than they were, but the moods of the North Country are not always gentle, and the combination of a broken propeller, a small boat, and high off-shore wind is not a good one along the shoal southern coast of Southampton Island. Sam Ford's assistance took many forms. He helped me outfit my sub-expeditions; he drilled me many a night during the winter in the Eskimo language; he helped me in my trapping and photography; he took care of specimens which natives brought in while I was away; he went over his diaries with me and gave me recollections of trips he had taken over and about Southampton and on Coats Island. But Sam Ford helped me chiefly because during the long winter he was always friendly, always patient, and uncommonly considerate.

Mr. Ford's son Jack, one of the blithest young men in the North Country, was my all but constant companion. Jack helped me in everything—absolutely everything from difficult interpreting down to sewing on buttons. He was a keen observer, enjoyed hunting and trapping greatly, and seemed to derive keen pleasure from aiding me in this scientific survey of his "home island." Jack and I took never-to-be-forgotten dog-team trips in winter; he accompanied me to Seahorse Point, where he shot Polar Bears, while I chased ravens; we two went swimming and diving together in the chill waters of the Inlet much to

the amazement and amusement of the natives; and in the spring two of my most important trips were satisfactorily accomplished largely because of Jack's enthusiastic, untiring assistance.

Chief among the Eskimos who helped me was Amaulik Audlanat,¹ the sturdy, capable Aivilik known as "John Ell." John had had much contact with white men and knew a good deal of English. He went with me to Cape Low, to Seahorse Point, to East Bay, and to the floe south of Bear Island. We became great friends. Not only was John an expert mechanic, boatman, huntsman, dog-team driver, and igloo-builder, but he was also a keen player of games, a companionable and strong man. Much of the success of my expedition was due to Amaulik's ability and knowledge. He took care of my guns, helped me in taking pictures, skinned caribou, walrus, and seals for me, and kept me comfortable, while we were together in the field. John told me many interesting Husky stories. He was always gentlemanly. He never became excited, even when circumstances appeared to warrant tumultuous anxiety.

The intelligent Eskimo, Tommy Bruce, was also very helpful. Tommy and I, with our dog-team, started to cross the high country north and east of the Post in an attempt to reach Fox Channel, where we expected to find White Gyrfalcons nesting. We had a splendid time together, even though our trip in large measure was a failure. Tommy Bruce undertook the special Cape Kendall Blue Goose sub-expedition for me in June, and was successful in securing both birds and eggs, as well as many very interesting data.

Muckik, Kyakjuak (or "Curly Joe"), Pumyook, Kooshooak, Shookalook, "Cabin Boy," Eevaloo, Angoti-Marik ("Scotch Tom"), Akaook, Keetlapik, Noah, all of them brought me specimens, or helped me in one way or another. One of my most delightful companions was young Santiana, Amaulik's son, who went with me about the Post, cleaned blood from bird-plumage, drove the dog-team, located nests, and collected bumblebees. Santiana was always cheerful and willing, though he did not clearly understand why specimens of mosquitoes should be laid out in state on white cotton together with less common and less bothersome insects.

The Roman Catholic Missionaries at the Post, most amiable and scholarly men, Fathers A. Thibert and Eugène Fafard, helped me in many ways, and were most hospitable, making me welcome at their Mission at any time and letting me play their little organ. Father Clabot took Father Thibert's place late in the summer of 1930.

The staff of the Carnegie Museum were most courteous in helping me pack my outfit during the hot days of July, 1929, and in working with me in arranging the collections upon my return. Dr. Andrey Avinoff, Director of the Museum, spared no pains in sending me off well equipped. Mr. Graham Netting, Curator of Herpetology, directed the unpacking of the collection for me in masterful fashion; and Mr. R. H. Santens, Dr. O. E. Jennings, Dr. Hugh Kahl, Mr. John Link, and Miss Maud Gittings all helped. I want to thank Mr. W. E. Clyde Todd, Curator of Ornithology of the Museum, in particular: first, for taking me on his earlier northern trips "down" the Labrador and into Hudson Bay; second, for being so unflinchingly accurate and painstaking in all his work as to be a constant inspiration to me; and third, for his assistance in my various problems connected with the identification of material, in looking up references in little-known literature, and in loaning specimens.

Mr. Bayard H. Christy of Sewickley, Pennsylvania, Editor of *The Cardinal*, put himself to considerable trouble in helping me ascertain the status of Southampton Island on the earlier maps, and in determining the source of the name Southampton.

¹Mathiassen (1931, pp. 11 and 12) refers several times to an Eskimo named Audlanâq. I am practically certain that Audlanâq and Amaulik Audlanat are one and the same man.

Captain George Comer, of East Haddam, Connecticut, has told me much about the whaling activities in Hudson Bay, and has permitted me to go through all his numerous Southampton diaries.

Colonel L. A. Luttringer of Harrisburg, Pennsylvania, and his son, Leo A. Luttringer, Jr., were of great assistance to me before I left for Southampton. Colonel Luttringer presented the Expedition with a most useful canvas blind for photographic work.

The Scranton Bird Club of Scranton, Pennsylvania, proved their interest in the Expedition by donating a considerable amount of photographic equipment. I wish, also, to thank Mr. and Mrs. Francis Hopkinson Coffin, of Scranton, for the outward expression of their interest. Mr. Kenneth Doult, at present in Berkeley, California, gave me a good tripod and an excellent field-kit. Mrs. Elsie Singmaster Lewars, of Gettysburg, Pennsylvania, and Colonel E. J. Stackpole, Sr., of Harrisburg, gave me articles of trade for the Eskimos. The Girl Scouts of Harrisburg gave me boxes of attractive jewelry for the Eskimo children. All these expressions of interest helped me more than I can say.

Dr. Arthur A. Allen of Cornell University, Ithaca, New York, has been a constant source of inspiration to me as I have worked upon this paper.² Drs. A. H. Wright and W. J. Hamilton, also of Cornell, have helped me in every possible manner. Mr. E. R. B. Willis, Associate Librarian of Cornell University, has helped me in securing from various libraries such books and periodicals as I needed to consult.

I wish here publicly to thank Radio Station KDKA of Pittsburgh, for devoting so much time during the winter to broadcasting messages to me from my friends. These messages came at a time when they were most needed. And some of them were of considerable importance to the expedition. Mr. Louis L. Kaufman, who broadcasted many of the messages, was cheerful and companionable in all that he said, as were also his fellow announcers. My mother, Mrs. H. T. Sutton of Bethany, West Virginia, played for me on the piano; Dr. Arthur W. Henn, of the Carnegie Museum, undertook the matter of seeing that messages were sent to me from my old associates; the Bethany College Orchestra, under the direction of Dr. B. R. Weimer, and a quartet from the Psi Chapter of Beta Theta Pi at Bethany gave me a delightful musical program in December. Hundreds of messages came to me during the winter: proof of the interest of my friends in my personal welfare and the success of the scientific enterprise. For all these expressions of friendship I was, and am, deeply grateful.

Lastly, and lastly only because we are soon to begin the paper itself, I wish to express my feeling of indebtedness to Dr. William J. Holland, Director Emeritus of the Carnegie Museum, for sympathetically editing my manuscript. Dr. Holland is a friend of long standing. While on Southampton I thought of him again and again, as I chased butterflies, which I hoped he might one day see. If the present volume is to be "of good report," its state of well-being will in no small measure be traceable to Dr. Holland's careful editorial supervision.

²Part I, Sections I, II, and III; and Part II, Section II of the present volume of these Memoirs were prepared by the author as a thesis for presentation to the Faculty of the Graduate School of Cornell University in partial fulfillment of the requirements for the Degree of Doctor of Philosophy.

SECTION 2—GENERAL INTRODUCTION

DESCRIPTION OF SOUTHAMPTON ISLAND

GEOGRAPHICAL POSITION

Southampton Island lies at the mouth of Hudson Bay, directly south of Melville Peninsula, almost directly west of the southern part of Baffin Island, and east of the Chesterfield and Wager Inlet region of the mainland of northeastern Keewatin. The Island is roughly an equilateral triangle, with its apex pointing toward Repulse Bay, its eastern side bounded by Fox Channel, its base by Evans and Fisher Straits, and its western side by Sir Thomas Roe's Welcome. The long, narrow Coats Island lies not far to the southeast; and Mansel Island is not much farther away to the east and south. Southampton is considerably nearer to the western shore of Hudson Bay than it is to the region of Cape Wolstenholme.

Cape Frigid, the northernmost point of land on White Island, which lies but a short way north of the main body of Southampton, is a little north of Latitude 66° N. Cape Munn, the northernmost point of Southampton proper, is a little south of Cape Frigid. The southernmost point of the Island, in the region of Cape Low, is virtually at Latitude 63° N. The Island is therefore at about the same distance south of the North Pole as are Nome, Alaska; Iceland; the White Sea; and the southern part of Greenland.

Southampton is directly north of the State of Michigan. Seahorse Point, the easternmost point on the Island, is but little west of the 80th parallel, and Cape Kendall, the western extremity, is a little west of the 87th parallel.

AREA

Low (1906, p. 114) states that the area of Southampton is 19,100 square miles. I am not sure whether this estimate includes White Island to the north, Walrus Island and other islands in South Bay, and the islands at Seahorse Point. Munn (1919, p. 52) says that the Island is "about 20,000 square miles in extent." The Island has an area, therefore, roughly half of that of the State of Pennsylvania.

BOUNDARY WATERS

Fox Channel, the body of water to the east, separates Southampton from Baffin Island, the nearest point of which is about 100 miles northeast of Seahorse Point. Frozen Straits, to the north, are not very wide, and the distance from the Duke of York Bay region or the northeastern edge of White Island across to Vansittart Island is so short that this channel sometimes freezes across in winter. Sir Thomas Roe's Welcome, to the west, varies from about 25 to 70 miles in width. Fisher Strait and Evans Strait to the south are narrowest just north of Cape Préfontaine on Coats Island, which point is perhaps thirty miles from Leyson Point on Southampton. To the southwest of Cape Low the open waters of Hudson Bay reach out for several hundred miles; and Fox Channel extends to the northeastward about four hundred miles toward the upper part of Baffin Island. Seahorse Point is roughly one hundred miles from Cape Wolstenholme.

PHYSIOGRAPHY AND TOPOGRAPHY

By far the most extended discussion of the physiography of Southampton Island has been given us by Mathiassen (1931, pp. 13-23), whose account has been written in great detail.

Briefly, the eastern third or half of the Island is much higher and rougher than the western portion. Along the entire Fox Channel frontage the land rises abruptly. Here there are gulches, cliffs, and fjords. At Seahorse Point there are spectacular cliffs which appeared to me to be about three hundred feet high, rising sheer from the sea. Mount Minto, which is said to be the highest point on Bell Peninsula, the southeastern corner of the Island, is, according to some writers, 1050 feet high (see Comer, 1910, pp. 84-85). The Porsild Mountains, so named by Mathiassen in 1925, are said to "reach up to about 500 M. [1600 feet] above the sea" (see Mathiassen, 1931, p. 19). These mountains form a sort of ridge, which is parallel to the Fox Channel shore-line, and of which Mount Minto is the southeastern extremity, and White Island a northern portion, cut off from the rest of the range by Duke of York Bay. At the Post, at the head of South Bay, the terrain is neither especially rugged and high, nor especially flat. To the eastward extend rocky ridges, which loom up in the distance as a considerable blue-violet wall; to the west the land rolls off in gray and brown monotony toward Cape Low. At Native Point there are rather high gravel-ridges or mounds, and at many places along the southern shore between the Post and Cape Low there are noticeable bluffs, but, generally speaking, the western part of the Island is exceedingly flat. The highest land along the frontage of Sir Thomas Roe's Welcome is said to be at Cape Kendall and Manico Point (Comer, 1910, p. 85). Button, who was probably the first navigator to see Cape Kendall, though he did not give the place its present name, called it "very high Land" (Christy, 1894, p. 183); but, as noted elsewhere in the present paper, it could have appeared "very high" only by comparison, or because of a mirage, since the whole western coastal region is in reality low. Regarding the Cape Kendall region Captain Comer has made some interesting statements in his notebooks, all of which were turned over for my perusal, and from which I wish to quote here:

"This summer, 1899, we left Cape Fullerton with three boats on June 27 and landed at Cape Kendall that night. These shores are very difficult to land on and only at high tide can it be done without wading the flats extending from one to two miles off shore.

"From Cape Kendall to the Bay of God's Mercy the land is quite wet, but there is plenty of grass and flowers. There are many deer³ too, which we found to be quite fat. Along the shores are many stone cairns for storing meats and blubber.

"There is a low piece of land two-thirds of the way from Cape Kendall to the Bay of God's Mercy, which at a distance has the appearance of a body of water extending across to the shore north of Cape Kendall and making an island. The Bay of God's Mercy does not have the appearance of being a fit place for a vessel to go, as there are many shoals far from land, especially along the north shore. It would look as though this bay were the outlet of some large stream which might drain the country inland. All to the south of this bay the country differs little. There is no grass. The land rises as one goes back, it being highest back of Manico Point, then falling off as one goes to the south. It seems to be composed wholly of small sharp stones, much of it limestone with a little flint, and some sort of larger flat stones. Many of these large flat stones have markings upon them as though bushes and small sticks had been imbedded in them while they were in a plastic state.

³In all of Captain Comer's notes, caribou are referred to as "deer."

"Many gulches extend down to the shore, which are probably filled by the freshets of early summer. Occasionally there are snow-banks along where the land is steeper near the shore. The flats here do not extend as far off shore, and landing can be made at low tide, but to haul a boat up, we would have to wait till high tide."

On some charts (See, for example, Comer, 1910, p. 85) are marked two "peculiar, shed-like hills," one not far west of the head of South Bay, the other not far from the coast possibly fifty miles east of Cape Low. These great mounds (both of which I have seen, though I did not ascend them) are said by the Eskimos to be of gravel: the former is inland a considerable distance from Munnimunek Point; the latter is actually not near the coast, as shown on the charts, but about twenty-five miles inland; and the Eskimos who have seen and visited this *Noovoodlik* (as they call it) maintain that there are at least five such "hills" stretched out in a rather regular line between the region inland from Cape Kendall and this last, most southerly one, which can so easily be seen from the coast.

BAYS AND INLETS

The principal indentations on the eastern side of Southampton are formed by Duke of York Bay to the north, and East Bay, which is a little over fifty miles westward from Seahorse Point. Another indentation which the Eskimos *always* show in their own charts (see Mathiassen, 1931, p. 11, and Figs. 1 and 2 in present paper) as east of East Bay and north and west of Seahorse Point, may be Gordon Bay, so named by Captain George Back, but which appears not to be indicated in most of the published maps at hand.

The southern side of the Island is deeply indented by South Bay, the innermost part of which, Coral Inlet, is nearly a hundred miles north of the mouth. Along the eastern shore of South Bay are further indentations, the innermost being Coral Inlet, and the other, which is north of Native Point, being called Native Point Bay, Big Rock Bay (an Eskimo appellation) or "Shallow Bay" (see Comer, 1910, p. 85).

At the southwestern corner of the Island, lying between Cape Low and Cape Kendall, is the large Bay of God's Mercy, named by Lyon. Into this bay flows the Boas River.

RIVERS

There are only a few relatively large streams: the Cleveland River, which drains northward into Duke of York Bay (see Mathiassen, 1925, p. 562); the Kirchhoffer, which drains southward into the western shore of South Bay, and which plunges over a fifty-foot fall (Kathleen Falls) near its mouth (see Munn, 1919, p. 53); the Boas, which flows southwestward into the Bay of God's Mercy; and the Thomsen, which, according to Mathiassen (1931, p. 21) "has a rather big flow and drains the big Hansine Lake . . . [in] a continuous chain of whirlpools and broads."

Among the somewhat smaller streams, which are raging torrents in the spring, are: 1. The Canyon River which flows northward into Mathiassen's Foengselsporten (Mathiassen, 1931, p. 19), the valley of which is "a pronounced canyon, of deep ravines, through which the river forms high waterfalls with vertical, sometimes overhanging walls, alternating with more open sections." 2. The Anderson River (named in the present paper), which flows southward into Evans Inlet in the region of Leyson Point, and which has cut a deep gorge into the limestone not far from its mouth. 3. The Ford Rivers (named in the present paper), which flow westward from the region of Itiujuk into the head of Coral Inlet. 4. The Ranger or Kashigiak River, which empties into Fisher Strait not far east of Cape Low.

5. Two salmon-streams, one of which flows westward into Sir Thomas Roe's Welcome (probably the Murray River of Mathiassen, 1931, map), and one eastward into South Bay.
6. The stream known among the Eskimos as the Koodloutok, which flows southward into South Bay not far west of the Post, and which in my opinion has nearly the position of the Kirehhofer River, as shown in Mathiassen's map (1931, chart).

LAKES

All along the shores of Southampton Island, and presumably, though somewhat less abundantly, inland, are innumerable lakes, varying in size from tiny ponds, most of which are shallow, even marshlike, to magnificent bodies of water such as those northeast of Itiuchuk, and west of Duke of York Bay. This latter is so extensive that, according to old Shoo Fly⁴ and others, one can "walk a day along its western shore and yet not reach the end." This body of water is doubtless the Hansine Lake of Mathiassen (1925, p. 562). Other large lakes occur at the headwaters of the Koodloutok River (perhaps Mathiassen's *Darkness Lake*); northeast of Cape Low; inland from Sir Thomas Roe's Welcome; and to the southwest of Duke of York Bay. The lakes in the Seahorse Point region, and indeed all along the shore of Fox Channel, are not, as a rule, very large. Those at the head of South Bay are all small or medium-sized.

OFFSHORE ISLANDS

The largest island among those which lie close to Southampton is White Island, to the northwest of Duke of York Bay. This considerable body of land was probably first seen by Middleton at the time he named its northernmost extremity "Cape Frigid." The island is probably between forty and fifty miles long and about ten miles wide (according to Comer's Chart) and extends in a northwest-southeasterly direction. It is separated from the main part of Southampton by a narrow "Boat Channel" called "Comer's Strait" on some charts (Mathiassen, 1931), a name, which according to the word of Captain Comer himself, was first given by Captain J. E. Bernier. At the northwestern end of White Island are several small islands, upon one of which Hall once stopped for a short time. At the southeastern end, not far from Cape Deas Thompson, are the so-called Nias Islands, and the Black Rocks. The highest point on White Island is Mathiassen's Mount Tantalus (552 feet).

The island, which in my map I am naming Tooktootok (Aivilik Eskimo word for "Place of Caribou") is a fair-sized body of land, possibly six miles long and four wide, lying not far from the main shore just north of East Bay. In most charts I have seen this island is shown as much larger than it really is. Near the island are several small, low islets.

The peninsulas now known as Bell Peninsula and Gore Point were once thought to be islands, but their insularity has long since been disproved (Comer, 1910, p. 84).

There are several small islands in the Seahorse Point region which were discovered and charted, though not named, by Baffin, in 1615, though curiously enough they have disappeared from more recent maps. That these islands do exist I myself know, for I have seen them all and have been on or across some of them. The largest is that upon which Seahorse Point itself, apparently, is located. At low tide this island is almost joined to the "mainland" by a narrow ridge of gravel. The other islands are farther offshore. Two of these, which appear to be quite high, with more or less precipitous shores, are to the northward of Seahorse Point, and three others lie just northeast of the Point. These islands will

⁴I have not ascertained the native name of the Eskimo woman, who was called *Shoo Fly*.

be more minutely described later. I propose that the single island at Seahorse Point should bear the name of George Back, who wintered thereabouts with his crew in the *Terror*; and that the two most northerly islets be named after William Baffin, who named Seahorse Point, and that the three most easterly islets should be called the Semple Islands, after Mr. Semple, who made possible the expedition upon which I am reporting.

There are several islands in South Bay, the most important of which is Walrus Island, which lies in Lat. $63^{\circ} 17'$ (Comer, 1910, p. 84) about sixty miles south of the Post. While Walrus Island is not large, nor particularly high, it is nevertheless rather a striking, cliff-like mass, and it contrasts strongly with the flat shores of the portion of Southampton nearby.

Bear (or *Bare*, the latter, preferably, I should say) Island is a low, uninteresting pile of gravel lying about seven miles south of the Post. It is scarcely more than a quarter of a mile across, though it is shown in most charts as at least three miles in length. Guard Rock, and two other small islands along the western shore of South Bay are also very much magnified in all the charts at hand; and one of these (see Munn, 1919, chart), which is, in reality, two islands, should certainly be called *Tern Islands*, since Arctic Terns are abundant there.

Yet one more island is to be found along the southern shore of Southampton. This one is located east of Native Point. The Eskimos call it Kikkuktoiyak.⁵ It is an important breeding-ground for the Northern Eider and Old-squaw Duck.

There are apparently not any islands along the western shore of Southampton. Captain Comer has definitely disproved the existence of Tom's Island in Sir Thomas Roe's Welcome (1910, p. 84), but he discovered and described a dangerous reef north of Cape Kendall, which he thinks may have been taken for an island by the earlier navigators.

The water all along the southwestern shore of Southampton is exceedingly shoal, and harbors are few. In the Seahorse Point region the water is deeper and there are many shelters and coves. According to Amaulik Audlanat, who has circumnavigated the Island, the northern and northeastern shores are furnished with suitable harbors, so that navigation thereabouts is comparatively easy.

GENERAL HISTORY OF THE DISCOVERY AND EXPLORATION OF SOUTHAMPTON ISLAND

Henry Hudson in 1610 discovered the great bay which today bears his name; but it is not clear from the records of his voyage whether he reached or saw the western coast of the bay proper, and it is doubtful that he ever saw any part of Southampton Island. Hudson's own diary of this, his last, ill-fated journey, stopped just after his ship, the *Discovery*, had sailed through Hudson Strait, near Cape Wolstenholme, and past a cluster of islands, the nearest headland of which he had named Cape Digges. The record of the rest of the voyage was kept by "one Abacuk Pricket," and the veracity of this record, which is incomplete, has apparently been open to considerable question (see Barrow, 1818, p. 189). Prickett makes no mention of land seen anywhere during their fall journey from the vicinity of Digges Islands to the region of James Bay, so it is likely that the *Discovery* stood so well out to sea that no glimpse of Southampton was caught by the crew. Miller Christy, in a footnote to an Appendix (covering a charter granted to the Company of the Merchants Discoverers of the North-West Passage, June 26, 1612) to his *Voyages of Foxe and James to the North-West* (1894, p. 642) suggests that Southampton Island was named by Hudson or Button. I cannot find why Christy believed that Hudson may have had anything to do

⁵The word *Kikkuktoiyak* means merely "a small island."

with the naming of the Island, or indeed with the giving to any land in the region the name of Southampton.

Captain Thomas (later Sir Thomas) Button, equipped with two ships, the *Resolution* and the *Discovery*, navigated the west coast of Hudson Bay in 1612 and 1613, and it is very likely that Button first saw or touched upon Southampton. Unfortunately, and "for reasons one cannot well comprehend" (see Barrow, 1818, p. 196), the personal record of Button's voyage was never published. Certain verbal information and abstracts taken from Button's own journal by Sir Thomas Roe were published some years afterwards by Foxe (1635, p. 117) and from these we know something of the movement of the expedition. Button purposed to follow the track of Hudson. After passing through Hudson Strait, however, he proceeded directly to the westward where he made "the southern part of a large island, which in some charts is called Southampton Island, and to which he gave the name of Carey's Swan's Nest" (see Barrow, 1818, p. 197). The island upon which he touched was not, of course, Southampton, but rather Coats Island, the large island just to the south of Southampton. It was not until the following year that Button actually reached Southampton. After wintering at the mouth of the Nelson River, he proceeded northward, in the spring of 1613, along the "eastern coast of America," and eventually ascended what is now known as Sir Thomas Roe's Welcome to about the latitude of 65° N. He then turned back to the southeast and explored along the western side of Southampton Island.

The first land he saw on Southampton according to Christy, was "probably Cape Kendall" (1894, footnote, p. 183). I entertain some doubt as to Button's having seen Cape Kendall at this time, for the land he describes as "faire by him, bearing E. S. E. [was] very high Land" (from Foxe's narrative of Button's voyage, as quoted by Christy, p. 183) and it is now known that Cape Kendall, while admittedly higher than Cape Low, could hardly have been bold enough to merit being called "very high," unless there were a mirage. This first-seen point of land Button apparently called Cape Phillips, since this name appears at about the position of the present Cape Kendall on Briggs' map in Purchas (p. 177).

After moving southward and eastward far beyond the vicinity of his Carey's Swan's Nest, Button came upon "islands," which he called "Mancel's Islands," the land subsequently referred to as "Mansfield's Islands" (see Barrow, 1818, p. 200) and which is now known as Mansel Island. From here he again turned north, and came once more to the southern shore of Coats Island, to Carey's Swan's Nest. Here he named the extreme point of land to the west as Cape Southampton and the extreme point to the east as Cape Pembroke; which names (it may incidentally be remarked) do not appear on Baffin's map of the region, which was published in 1615.

In Button's journey northward into the strait now known as Sir Thomas Roe's Welcome, he did not go far enough to enter Frozen Strait, north of Southampton; nor did he, in returning southward, find the channel now known as Fisher Strait, which leads between Southampton and Coats Island. Evidently he did not know, either that Southampton was separated from the mainland at the north, or that his Carey's Swan's Nest was located on an island distinct from that upon which he had discovered and named his Cape Phillips.

Button gave the name Southampton to the cape west of Carey's Swan's Nest in honor of "our right trusty and well beloued Cozen, Henry, Earle of Southampton," but I cannot find the definite authority for Miller Christy's statement (*Voyages of Foxe and James*, Appendix D, footnote, p. 642) that Button (or Hudson) named any island, or indeed any land of any sort aside from this Cape, in honor of the Earl of Southampton.

It is quite possible that, with the naming of Cape Southampton, this name gradually

came into general use as a title for the body of land later known to extend north of Southampton Cape. The region may even have been called Southampton Land, before it was known to be an island. One map, indeed, tends to make this possibility seem plausible. This map was that which illustrated Daines Barrington's *Possibility of Approaching the North Pole Asserted* (1818), on which Southampton Island is called "Southampton Land."

Fite and Freeman's *A Book of Old Maps* presents a reproduction of one of the Purchas maps (p. 128) on which Southampton Island is shown as a peninsula projecting from the continental mass and labelled as "*Caries Swanes Nest*," "*C. Southampton*" and "*C. Pembrook*" are named. The accompanying text reads: "Sir Thomas Button, guided by two of Hudson's crew, spent the winter of 1612-1613 on Hudson Bay searching for the lost leader. He named *Porte Nelson* and Nelson River in honor of his mate who died there, and scattered about several other English names . . ."

I have not ascertained that Button actually gave the name *Southampton Land* to any region, but the inference that he was indirectly responsible for the name becomes a practical certainty in view of his having named "Cape Southampton" and in view of the fact that no other explorer is known to have given the name Southampton to any land or sea-area in this region.

White's statement that the name Southampton was given by Foxe is probably an error (1910, p. 439), since I cannot locate any reference to the naming of Southampton Island either in *The North-West Fox*, or in Christy's *Voyages of Foxe and James*.

In 1615, Robert Blyeth (see Barrow, 1818, p. 206) or Bylot, with William Baffin, as mate and associate, again reached Southampton. Sailing westward from Salisbury Island and the islands they named "*Mills Islands*," they ran into treacherous ice-filled waters where the currents were strong and where the ice threatened at any moment to destroy them. Baffin, who kept a careful record of the journey, wrote of this experience: "but God, which is still stronger then either ice or stream, preserved us and our shippe from any harme at all." They were then just east of Southampton, in the body of water known today as Fox Channel.⁶ Upon sailing northwestward they found themselves breasting a steady current from the northward, and were so overjoyed at the possibility of their having found the coveted "North-West Passage," that they named the Cape nearby Cape Comfort. After sailing northward from this point they observed that the land stepped "away to the northeastward" and concluded they were in a great bay, and so, much disappointed, turned south. On present-day maps of Southampton Island is a Cape not far north of Cape Comfort which W. E. Parry (1821) named Cape Bylot "as being probably the westernmost land seen by that navigator in 1615."

As Bylot journeyed southward, he encountered many "morses" [Atlantic Walruses] on the ice. In Baffin's journal we find this statement: "By eight a clocke we were come to this southern point, which I called Sea Horse Point, where we anchored open in the Sea, the better to proue the sett of the tyde" (see Markham, 1881, p. 133). I find no intimation that any of Bylot's men landed at Seahorse Point. There evidently was some discussion among the crew as to whether they should attempt to kill any of the "Morses," which were found to be very wary. Apparently after a consultation they decided to proceed direct for Nottingham Island. They took careful notes upon the tides at Seahorse Point.

It is highly interesting that on the map, which Baffin made, covering this voyage (reproduced by the Hakluyt Society, June, 1881) there are indicated at least three small islands

⁶In most modern maps the spelling *Fox Channel*, or *Fox Basin* is used; in earlier times the name of the explorer was usually spelled *Foxe*.

near the colorful flag, which is drawn just outside the Cape marked "Sea horse. p." These islands, curiously enough, are not shown in most subsequent maps, and they are entirely missing on the most up-to-date maps of Southampton which I can find. They should, however, be indicated on our present-day charts, for I have seen all and been upon some of these very islands myself.

It is perhaps strange that Baffin himself gave the name Seahorse Point (see White, 1910, p. 433), while Bylot was master of the vessel. Bylot on the other hand is accredited with naming Cape Comfort.

Mathiassen, writing in 1928 (*Material Culture of the Igloolik Eskimos*, p. 4), states that Bylot and Baffin saw the west coast of Southampton in 1615. Baffin's own tracing of his itinerary does not include any journeying southwest of Seahorse Point, so far as I can determine.

On Baffin's map no mention is made of Button's *Carey's Swan's Nest*, *Cape Southampton*, or *Cape Pembroke*, though the general delineation of the coast-line apparently agrees with Button's own charts.

In 1619-1620, Jens Munk made his way into Hudson Bay in the name of the Danes. He gave names to the various bodies of water and land which he encountered, and his charts, which were wholly at variance with known maps, "upset or distorted the whole geography of Hudson's Sea" (see Barrow, 1818, p. 231). In the course of Munk's northward travels he must almost have reached Sir Thomas Roe's Welcome, for he indicated on his chart two hitherto unknown fjords, which were probably Chesterfield (or Bowden's) and Ranken Inlets, of today. He wintered in an "opening," which he called *Munk's Winter Harbor*. According to the map illustrating P. Lauridsen's *Jens Munks Navigatio Septentrionalis*, this *Winter Harbor* was the mouth of the Churchill River. He called the country about him *New Denmark*. There is a possibility that Munk saw the western side of Southampton Island, but he certainly did not recognize it as an island, nor did he, so far as I can determine, give it any name.

In 1631, the vivid and romantically egotistical Captain Luke Foxe, who called himself "*The North-West Fox*," made his way into Hudson Bay, hoping to follow up and further the discoveries of Bylot and Baffin. He reached *Carey's Swan's-Nest* (Coats Island) on July 20, apparently without having seen the eastern shore of Southampton Island. Sailing westward and northward "along the eastern shore of America," he discovered a small island, which he named Sir Thomas Roe's Welcome, in honor of a gentleman who had assisted him financially in his voyage. This name has since been transferred to the strait in which the island lies. There is no record of his having seen or touched upon Southampton, though he encountered and named several islands in the waters to the westward of Southampton. It is strange (as, indeed, Barrow remarks) that the "sagacious and merry Foxe," who was so eager to find the North-West Passage, "should not have persisted . . . in tracking the current [of the tide in Sir Thomas Roe's Welcome] to the northward, from whence he observed it to flow, instead of following it to the southward."

It was this Luke Foxe, who, according to White (1910, p. 439), gave Southampton Island its name. This statement I cannot verify. Nowhere in Foxe's not overly modest writings do I find any reference to his giving the name Southampton to any body of land or water. Furthermore, Miller Christy, who made a careful study of Foxe's writings, definitely accredits either Button or Hudson with the naming of Southampton Island.

Fox Channel, the mighty and treacherous body of water to the north and east of Southampton Island has been named in honor of Captain Foxe.

The Hudson's Bay Company came into being in 1670. Between the voyage of Foxe in 1631 and that of Captains George Barlow and David Vaughan, in 1719, there is scant record of any exploration in the vicinity of Sir Thomas Roe's Welcome or Southampton Island. Barlow and Vaughan, commanding the *Albany* and the *Discovery*, sailed from Gravesend for Hudson Bay in 1719, under the general command of Captain James Knight, who had been "Governor of the factory established on Nelson's River." The two ships never returned. Since no word came from these two vessels, the Company equipped another vessel, the *Whalebone*, commanded by John Scroggs, which was to search for the lost party. Captain Scroggs sailed into the Welcome as far as 64° 56' N. in 1723. A brief abstract of the voyage was published by Mr. Arthur Dobbs. It was only in 1767 that Joseph Stephens in the *Success* discovered that the *Albany* and her sister-ship had been wrecked at Marble Island, where their hulks were found in five fathoms of water. On shore were the ruins of a frame house; many graves, some rifled by wolves; guns, anchors, cables, an anvil, and other things valueless to the Eskimos, who said the party had miserably perished of starvation.

Certain authors have stated that the Hudson's Bay Company, in attempting to monopolize the trade among the natives, discouraged all exploration to the north of Churchill or the "extending [of] their trade that way for fear they should discover a passage to the western ocean of America, or tempt by that means the rest of the English merchants to lay open their trade . . ." (see Arthur Dobbs, 1744, p. 48). The above passage, which was quoted by Barrow (1818) included the following footnote (p. 280): "There can be little doubt that the Hudson's Bay Company were for a long time exceedingly jealous of their monopoly; and that they naturally discouraged all attempts at northern discovery, and withheld what little information came to their knowledge; but of late years the Governors of this Company have liberally communicated whatever information may have been sent to them respecting the geography or hydrography of Hudson's Sea and lands adjoining. . . That their servants have not been very active in collecting information is quite true; but the fault is rather to be ascribed to the individuals than to the Company."

The work of this great Company in the North Country merits far lengthier treatment than I can present here. Their interest in procuring raw furs led them to establish Posts in most inhospitable regions. They formed mutually helpful contacts with natives in the remotest places. They always have been deeply interested in exploration and in scientific research. That they were at an early date interested in advancing the knowledge of the geography of Hudson Bay is evident from the expeditionary work they inaugurated and carried through. One such expedition, organized in 1737, was to examine "the eastern coast of the Welcome [Southampton Island] to the north of their settlements." No proceedings of this expedition, which was performed by two small vessels, were ever published. But the findings of Foxe, Button, and Scroggs, as regards the set of the tide from the northward, were corroborated.

In 1742, Captain Christopher Middleton, representing the Hudson's Bay Company, voyaged northward into Sir Thomas Roe's Welcome in the *Furnace*. He discovered the Wager River with its Inlet. To the eastward he sighted a Cape, which, believing it to be the northeasternmost corner of the continent of North America, he named *Cape Hope*. The next day, however, he found he could not proceed more than a few miles to the eastward without being blocked by vast fields of ice, and the body of water, which he viewed from an eminence, appeared to be a "frozen strait," which obviously could not be navigated. Middleton was thus the first explorer to discover that Southampton was cut off from the mainland. But it is not evident from his writings that he was precisely aware of this fact,

nor does he at any point refer either to Southampton Land or to Southampton Island, so evidently he did not attempt to give the region a name.

He named *Repulse Bay*, however, in commemoration of his failure to find the long sought North-West Passage; he gave the name *Frozen Strait*, because "it was all froze fast from Side to Side and no appearance of its clearing this Year." The northernmost point on Southampton for obvious reasons he called *Cape Frigid*. Middleton had had high hopes, but disheartened he turned southward and made his way back to England.

Middleton's failure, however, did not in the least shake public opinion as regards the existence of the North-West Passage. So deeply interested did many persons become, that a new sort of Company was organized in 1746, in which there were one hundred stockholders. From among these stockholders a "Committee" was elected. This "Committee" employed Captains William Moore and Francis Smith as commanders of the *Dobb's Galley* and the *California*; and these men were instructed to voyage once more to Hudson's Bay to seek the Passage. Moore and Smith reached Sir Thomas Roe's Welcome so late in the season that they considered it expedient to move southward before establishing winter-quarters. After some difficulties they found a suitable place at Fort York. During the following summer they made their way northward through the Welcome. Having reached Wager Inlet they spent some time trying to find a path of egress toward the north and west; failing in this, they sought an opening to the northward of Wager Inlet through Middleton's Frozen Strait and Repulse Bay. Though they might have continued their exploration of this Bay, they decided not to risk being caught for the winter, and accordingly started homeward on August 7, long before winter actually set in.

The highly entertaining report written by "The Clerk of the *California*" (a man who has been known as *Drage* and as *Charles Swaine*), is illustrated with several maps, two of which show Southampton Island. The first of these, presenting the Hudson Bay region according to discoveries made between the years 1610 and 1743, shows Southampton as a peninsula extending southward from the Repulse Bay region. Over the western coastal portion of this entire peninsula appears the following legend: "This is a very Barren Land of an easy Ascent nigh the Welcome, but very mountainous inland." Cape Southampton, Carey's Swans-Nest, C. Nesdrake [I cannot ascertain the source of this name], C. Pembroke, and Sea Horse Point are indicated.

A map inserted toward the end of the first volume shows Southampton as an island, but gives it no name, and to the northward of the island appears the legend "A supposed Strait." This map, dated 1746-47, may be the first one which recognized Southampton's insularity. Buache's map of 1752 also showed it as an island, named *Cary Swans Nest*. Cape Southampton is not named. The name *Southampton* seems first to have been applied to the island, as distinguished from the Cape, in Cluny's *American Traveller*, in 1769.

On Captain William Edward Parry's first voyage in the Arctic Seas (1819-20) he discovered most of the great fjords on the north coast of Cockburn Land. It was on his second voyage, however, in 1821-23, that he visited the Southampton region. On August 12, 1821, with Parry in the *Hecla*, and his second-in-command, Lyon, in the *Fury*, he decided to try to find the North-West Passage by pushing through Middleton's Frozen Strait. He found himself in ice-filled water, through which it was exceedingly difficult to sail. On that day Cape Welsford and Cape Deas Thompson were discovered and named, the latter after "one of the Commissioners of His Majesty's Navy." The ice-filled waters between and to the southwest of these points of land confused them greatly. They even thought they might be in the Repulse Bay region. On August 15, Cape Bylot was named. Here the men went

ashore. On August 18 Point Henderson was named "after Mr. Henderson," that is John Henderson, Midshipman in the *Fury* (see White, 1910, p. 379). By this time the Expedition had succeeded in tracing the entire shore-line of the body of water which lay between Cape Welsford and Point Henderson, and to this arm of the sea they gave the name of Duke of York Bay "in consequence of the Expedition having first entered it on the Birth-day of His Royal Highness" (Parry, 1828, p. 46). During the following days the *Hecla* and the *Fury* forged onward through Frozen Strait. They completed the voyage on August 21. Parry was thus the first navigator to establish definitely "the insularity of that portion of land which by anticipation has long been called Southampton Island" (Parry, 1828, p. 58). He continued his exploration in the Repulse Bay region along the east coast of Melville Peninsula and the southern coast of Cockburn Land, naming Vansittart Island on August 31 after "the Right Honorable Nicholas Vansittart, Chancellor of the Exchequer" (p. 91), and Fife Rock on September 4, after the "Mr. Fife who first discovered it on our former arrival on this coast" (p. 97). A small island to the south of Vansittart also was named in honor of William Baffin. He spent two winters in the region; one on Winter Island to the northeast of Southampton, and one at a point called Igloodik, not far north of Chesterfield Inlet.

In 1824 Captain George Francis Lyon (who had been Parry's second-in-command), sailing in His Majesty's Ship *Griper*, touched upon Southampton several times, while attempting to reach Repulse Bay through Sir Thomas Roe's Welcome. Lyon first saw Southampton on August 22. Sailing westward from Hudson's Strait, he "saw a part of the mountains of Southampton Island very distinctly in the west." He made his first landing on August 24th to the southwest of Seahorse Point, at a place he named Leyson Point, in honor of a Mr. Leyson, the Assistant-Surgeon aboard the *Griper*. The body of water to the south of Leyson Point he named Evans Inlet after a Mr. Evans, Purser of the *Griper*. Evidently he did not know that Cape Pembroke to the south was on a separate island, for he speaks of this point of land, and indeed of other points now known to be on Coats Island, as part of Southampton. He landed on Coats Island on August 27. After leaving Coats he sailed west and north, eventually reaching a point considerably north of the present Cape Low. Here he encountered savage gales, which all but wrecked the *Griper*. The whole crew were thrown into a state of dejection. After the storm, on September 2, Lyon found himself in a large body of water, which he named the Bay of God's Mercy, in commemoration of their miraculous weathering of the storm. The point to the northward of their anchorage he named Cape Kendall, in honor of the Assistant-Surveyor on the expedition, and the point to the southward he named Manico Point, after Lieutenant P. Manico, of the *Griper*. During the gale Lyon had been unable to ascertain his correct position and had taken the point he subsequently named Cape Kendall for Cape Fullerton to the west. During the following days the *Griper* sailed westward and northward a way, then turned south and made for the "American coast," the region just north of Chesterfield Inlet. They sailed not far from Cape Fullerton and Whale Point, and in a zig-zag course eventually turned north and east, reaching Southampton once more on September 11, at a point which Lyon named after Lieutenant Francis Harding of the *Griper*, who on the previous day thought he had sighted land to the eastward.

After leaving Harding Point the *Griper* sailed north a short way and then on September 13, after weathering a terrific gale, sailed southward, having failed to reach Repulse Bay, to be sure, but being in good enough condition to make the return trip home. On the 17th of September a body of land was seen to the eastward, which Lyon named *Tom's Island*

after the Mr. Tom "in whose watch it was first discovered." It is not known just what body of land this was, since Captain George Comer, sailing near, or indeed *over* the exact position of the island in a recent year, proved it to be non-existent (1910, p. 84). In a personal letter, dated East Haddam, Connecticut, November 30, 1930, Captain Comer says: "On the old charts there was placed an island, known as Tom's Island, in what is known as the Bay of God's Mercy, between Cape Kendall and Cape Low. Instead of . . . an island there were thirty-eight fathoms of water. It is well known . . . that by keeping the land close aboard on the starboard side the current will be with you, and to my mind the men who discovered this island had actually been carried around Cape Kendall [without their realizing it] and saw the reef which lies north of it." This reef Captain Comer describes in detail in his paper (1910, p. 84).

As the *Griper* made her way toward Hudson's Strait she once more rounded, not the southwest corner of Southampton, but the western end of Coats Island, and passed northward and eastward over much the same route she had taken in making her way in about a month before.

Captain George Back in 1836 voyaged in the waters about Southampton Island, hoping to continue Captain Lyon's work (1824) in reaching Repulse Bay, or Wager Inlet. He decided upon proceeding through Frozen Strait rather than through Sir Thomas Roe's Welcome, since it was at the time considered the easier route. Back sailed on the *Terror*. On the evening of September 13 he was not far from the nearest rocks at Cape Comfort—a name which he called "most inappropriate," for he was battered and buffeted about by the winds and tides for weeks in the region between Cape Bylot and the small Baffin's Island to the north. On November 14, a harbor not far from Cape Comfort was discovered and named in honor of Lieutenant William Smyth of the *Terror*. Back and his crew had one of the most harrowing winter experiences in the annals of Arctic exploration. The *Terror* was not snugly frozen in the ice in some sheltered harbor, as is often the case when ships of necessity winter in the Arctic, but she was whirled and tossed back and forth among the restless, savage Fox Channel ice, being carried now north, now south, and drifting even as far as Seahorse Point in February. It is to the eternal credit of Back and his men that they weathered this trying season, as well as they did, though the expedition, insofar as reaching Repulse Bay was concerned, was a failure. During the course of the *Terror's* voluntary and involuntary wanderings, many places were discovered and named. The following names were given, in honor of various members of the crew: *Stanley's Harbor*, for Lieutenant Owen Stanley; *McMurdo Point*, for Lieutenant Arch McMurdo; *Gore Island*, for Robert Gore, Mate; *McClure Point*, for Robert McClure, Mate; and *Cape Fisher*, for Peter Fisher, Mate. *Gordon Bay* was named in honor of Admiral James Alexander Gordon. *Gore Island* is not an island at all, as is known from Captain Comer's comments (1910, p. 85) and from my own personal observations, but is, rather, a point; and *Gordon Bay*, which seems not to be shown in most modern maps, is, in all probability a considerable body of water.

In 1840, the Hudson's Bay Company planned an expedition which was to explore the "northern shores of America . . . between the River Castor and Pollux of Dease and Simpson, and the Strait of Fury and Hecla, as it was then very generally supposed that Boothia was an island" (see Rae, 1851, p. B, 1). This expedition did not materialize, due to the unfortunate death of the man who was to lead, Mr. Thomas Simpson. A few years later, however, the Company organized another expedition under the command of Dr. John Rae. Rae set out from York Factory on June 13, 1846, with two ships, the *North*

Pole and the *Magnet*. He did not visit Southampton on his way to Repulse Bay, but he saw Cape Kendall on July 14, and made many interesting observations on the tides and ice conditions in Sir Thomas Roe's Welcome. During the duration of the expedition he made many interesting discoveries in the Repulse Bay region and to the northward, though he did not visit Southampton at all. On his return journey through the Welcome he planned to explore the western shore of Southampton from Harding Point southward, but was prevented by the ice. Rae's observations on the bird-life, as recorded in his report of the journey, are of great interest to the ornithologist.

Captain Charles Francis Hall made three voyages to the Arctic. The second of these, which extended from 1864 to 1869, interests us chiefly because he lived and studied much of the time in the Repulse Bay region. Hall's purpose was that of geographical study. His voyage to Repulse Bay was made in the *Monticello*, through Hudson Strait, south of Nottingham Island, between Mansel and Coats Islands, and then, after a digression to the south, west to the western shore of Sir Thomas Roe's Welcome and thence northward to Wager Inlet and Repulse Bay, where he wintered.

In 1865, he actually visited Southampton Island, landing on a small island near Cape Frigid on June 19, and making careful observations while there. This trip was not an easy one. He had started on June 10, and the whale-boat in which he journeyed was fearfully clumsy and slow. The region of Cape Frigid is referred to as "the bold and snow-capped mountains of the north side of Sedla (Southampton Island)." No mention is made of other trips to Southampton during the entire course of the long stay. In 1866 Hall's traveling was confined to the Repulse Bay region. During 1868 he voyaged to Lyon's Inlet, and in 1869 to King William's Land.

In sailing homeward from Repulse Bay in the ship *Ansell Gibbs* Hall passed through Fisher Strait and Evans Inlet, between Southampton and Coats Island. He may have been the first to make this passage. "Tom's Island" is marked on his chart and from the appearance of the line which indicated the voyage, the vessel must have all but brushed this "island," which has curiously enough since been proved not to exist (see Comer, 1910, p. 84)!

Some of the later North-West Passage and Sir John Franklin Relief Expeditions passed not far from Southampton. Repulse Bay was the headquarters for two of these Relief Expeditions: first, that of Dr. John Rae, in 1847-50, and 1853-54, by which the west coast of the Melville Peninsula was mapped; and second, that of Charles Francis Hall in 1846-49, wherein two sledge-journeys were made to Igloolik. Lieutenant Frederick Schwatka's expedition, as described by William H. Gilder (*Schwatka's Search*, 1881) had its headquarters near Depot Island from 1878 to 1880. Depot Island is just north of Chesterfield Inlet.

Whaling in the Hudson Bay region began in the middle of the Nineteenth Century. The first winter headquarters of the whalers were established at Marble Island, south of Chesterfield Inlet. In 1889 the *Arctic* wintered in Repulse Bay, where during subsequent years Ship's Harbor Island became a regular wintering place for the whaling ships. In 1893 Captain George Comer, an American whaler, visited the Southampton region. He landed on the island first in 1896 in the vicinity of Manico Point, southeast of Cape Kendall. From 1893 to 1920 Captain Comer was on or about Southampton many times, often for several consecutive years. He usually wintered at Cape Fullerton on the western shore of Sir Thomas Roe's Welcome, but once he wintered at Depot Island (1893-4) and once at Repulse Bay. He never wintered on Southampton. During his 1907-09 voyage he made a special survey of Southampton, upon which he reported in the *Bulletin of the American*

Geographical Society of New York (1910, pp. 84-90). In this survey he allocated and named the southwesternmost point of the Island, Cape Low, in honor of A. P. Low, at that time Department Minister of Mines, at Ottawa; definitely disproved the existence of the island known as Tom's Island, which had been shown in earlier maps as south of Cape Kendall; located a new reef fifteen miles north of Cape Kendall; named and charted Coral Harbor and South Bay; and properly located Walrus Island. The map accompanying Captain Comer's paper was exceedingly useful to me; I carried it on all my sub-expeditions about the Island. His charting of the South Bay district is of particular value to those who contemplate navigating these waters. Dr. Franz Boas made a personal study of the Eskimos in the Cumberland Gulf region of Baffin Island in 1888, but did not, so far as I have been able to learn, investigate the Southampton region. The collections from Southampton Island, upon which he wrote extensive Ethnological treatises, were chiefly made by Captain Comer.

One of the most important expeditions carried on in the Southampton region was that of A. P. Low, accomplished in 1903 and 1904. Low, sailing in the *Neptune*, studied the Arctic Islands. In making his way in to winter-quarters at Cape Fullerton he passed through Hudson Strait, reaching Leyson Point on September 13. From Leyson Point the *Neptune* steamed through the ice slowly to Seahorse Point. On the following day Low returned to Leyson, then went westward through Evans and Fisher Straits. Since no ice was seen in Fisher Strait, he rightly inferred that there must be no channel between the so-called "Bell Island" and the main part of Southampton. On September 15 he passed round the southwestern corner of the Island, then made his way northward toward Cape Fullerton.

On June 15, 1904, he made a whale-boat trip to Southampton; he was accompanied by "Dr. Borden, two seamen, and six Eskimos" (1906, p. 32). It required two days to cross Sir Thomas Roe's Welcome from Whale Point to the vicinity of Cape Kendall. The party remained on the Island a week, first moving southward, then gradually working northward until they were about ten miles north of their original landing place, some forty miles beyond Cape Kendall. They reached the *Neptune* again on July 2.

In starting the summer cruise through the other Arctic Islands, Low left Cape Fullerton on July 18, steamed eastward for Cape Kendall, then southward along the western coast of Southampton. He made his way through Fisher Strait once more, passing the "small but prominent Walrus Island" and naming Cape Préfontaine, the northeasternmost headland of Coats Island. After cruising about the Arctic Islands for some time, he returned once more to Fullerton before returning to Halifax, and in leaving passed not through Fisher Strait, but to the southward of Coats Island.

Captain John Murray, a whaler from Aberdeen, Scotland, who during recent years has been Captain of the Hudson's Bay Company annual supply-ship *Nascopie*, spent three consecutive winters on Southampton Island. He first landed on the Island in August of 1902. He lived for a time in a tent made from the sail of his ship. He had no contact with the Southampton Eskimos until April, 1903. He took several Aivilik Eskimos from Repulse Bay and some Okomiut from Lake Harbor, Baffin Island, with him. He was located first at Cape Low, where in 1929 we stumbled upon some of the very barrels and instruments he had left on the beach so many years before. He voyaged for whales as far eastward as Seahorse Point, and northward to Cape Kendall and Cape Frigid. Though he made certain excursions inland for caribou, these expeditions were never extensive, and, so far as I have been able to learn, he did not preserve any charts which may have been made by members of his crew.

I had the pleasure of seeing Captain Murray daily while myself voyaging to South-

ampton in 1929, and I enjoyed talking to him, because it was plain to me that he had very much enjoyed his experiences on and about Southampton. It is regrettable that his diaries have not been published in compact form.

In 1903 a barracks of the Royal Canadian Mounted Police and a Hudson's Bay Company Trading Post were established at Fullerton Harbor; the latter in 1912 being removed to Chesterfield Inlet.

Captain Henry T. Munn landed on Southampton in September, 1916, with a small party of Eskimos, intending to investigate the minerals and the Island's possibilities as a station for getting whales, walrus, or furs. He remained there for two years, leaving in the summer of 1918. His "home" was located near the head of South Bay, not far from Seal Point. During the summer of 1917 he made several journeys inland and along the coast, and in February, 1918, took some local natives from South Bay to Sir Thomas Roe's Welcome. He reached the coast of the Welcome about half way between Cape Kendall and Cape Frigid (1919, p. 53). According to the natives he was "the first white man to cross the Island." He was trying to reach the mainland via the Welcome, but his plans were frustrated by the ice.

Munn's map shows the location of the Kirchhoffer River, which he named, and of Kathleen Falls ("50 feet") which occur near this river's mouth. Several inland "salmon ponds" are indicated, and the altitude of the mountains is suggested. According to this map, Munn travelled, presumably by dog-sled or whale-boat, about half-way down the coast from his headquarters at South Bay, to Cape Low; northward to the high country, about thirty miles; northeastward almost to Fox Channel; eastward almost to Leyson Point; and also, in a circuitous route, to Native Point, thence quite a way inland, and finally back to his headquarters. Many of the Eskimos, with whom I came in contact, remembered Captain Munn very well. I walked about the site of his "house" at Seal Point again and again and saw many of the beacons, which he had erected from stones.

Mathiassen (1931, p. 9) says: "Capt. Munn's map gives much information concerning the interior, but on his journeys he had not the facilities for exact mapping, so that it is only sketchily drawn and somewhat incorrect in places."

In 1921 the Hudson's Bay Company established a Trading Post at Repulse Bay. Between the years 1919 and 1924, certain trapping activities were developed and a Post established on Coats Island, but this Post was abandoned with the establishment of the Post on Southampton Island in 1924.

In the meantime important geographical work had been accomplished by the Fifth Thule Expedition in charge of Dr. Knud Rasmussen. The headquarters of this expedition were established at Danish Island, near Vansittart Island, not far north of Southampton. The member of this expedition who came to, studied, and mapped part of Southampton was Therkel Mathiassen, now of the Danish National Museum at Copenhagen. Mathiassen voyaged to Southampton from Repulse Bay by whaleboat in August, 1922, expecting to carry on a brief archeological study. He landed in the Duke of York Bay region and made considerable excavations at a place called Kûk. He had expected to return promptly to headquarters at Danish Island, but was prevented from leaving the Island by the masses of drifting ice. With his Greenlandic interpreter, Jacob Olsen, he went on excavating at Kûk, explored the northern part of Southampton and the nearby White Island, spent the month of October at a Salmon Pond near Kûk, and moved about with the Eskimos, living as they did. In the fall he moved "across country to the lower Kirchhoffer River, staying there during the winter." Thence he "took a trip to South Bay. The return was made *via* the

Kirchhoffer River and along the coast east of Cape Bylot" (1925, p. 559). The region he visited during winter was not far from the site at which the Hudson's Bay Company established their trading-post two years later at the head of South Bay. Mathiassen did not, I understand, have a very pleasant sojourn on Southampton. Food was scarce, he became ill, he had not come prepared for a protracted visit. In February, 1923, the ice of Frozen Strait became solid enough to permit a sledge to cross from Danish Island and he and his interpreter were providentially rescued.

The map which illustrates Mathiassen's article in *The Geographical Review* (1925, facing p. 562), and that accompanying his *Contributions to the Physiography of Southampton Island* (1931, inserted) indicate that in the course of his work on the Island he charted much of the north central part, all of White Island to the north, the region surrounding Duke of York Bay, and much of the interior almost as far south as South Bay. On these maps appear some new names, which he gave the various places which he visited: the *Porsild Mountains*, the *Cleveland River*, and *Comer's Straits*. And on the map illustrating "the distribution of House Ruins in the Territories north of Hudson Bay" (1925) appear also the names: *Kûk* (to the west of Duke of York Bay, a point where considerable excavations were made); *Cañon River* (a small stream flowing northward, emptying into Fox Channel near Cape Welsford); *Hansine Lake* (perhaps the "Salmon Pond" near Kûk, where Mathiassen spent the month of October, 1922); *Foengselsporten* (a small bay or harbor east of Duke of York Bay); and many interesting native names, especially in the more southern part of the Island.

In the summer of 1924 Major L. T. Burwash undertook to reach Southampton from the eastward. His account (1930, p. 61) reads: "A crossing from Queen Cape [Foxe Land] to Southampton was undertaken, but when we had reached a point within six miles of the coast, a northeasterly wind closed the floes so tightly that a landing was impossible. The wind continuing, more ice was driven in and we were beset for three days before an opportunity for a retreat to the eastward presented itself." The map illustrating this report, and showing the routes of various voyagers, gives the impression that Major Burwash actually touched upon Southampton.

In 1924 the Hudson's Bay Company established a Trading Post at the head of South Bay, just east of Seal Point. Mr. Sam G. Ford, an employee of the Company, who had passed a life-time working in the North Country, was placed in charge of the erection of buildings and of establishing the trading centre. Mr. Ford, with his wife and four children, and Mr. Alfred Copland, arrived on August 24, on the *Bayeskimo*, and proceeded at once with their work. They lived in tents until the first building, a small, frame structure (now used as a general storehouse) was erected. During the first winter they lived in the building, which is now the Company Store. The dwelling in which the Factor now lives, and where I had my own headquarters, was built in 1926. The Eskimo servants' house was built in 1927. The Roman Catholic Mission building was erected in 1925 by Fathers Du Plaine and Girard. The Anglican Mission building, which has just recently been completed, was started in 1927. Mr. Ford, who had a motor-boat, the *Robert Kindersley*, during his first year, and other boats since, has been on Southampton continuously since 1924, save during 1927-28 when his health demanded expert attention and it was necessary for him to go "outside."

Mr. Ford travelled about the Island considerably during this time. In 1924 he did not make any extended trips either by motor-boat or dog-team; but he journeyed considerably about the South Bay region, and once went as far away as Native Point. During 1925 he made a difficult and memorable trip across land to Duke of York Bay and thence by boat to Repulse Bay, to get supplies. The Hudson's Bay Company supply-steamer, *Bayeskimo*,

was wrecked and sunk before it had discharged supplies at Southampton that year, and the emergency supply-ship *Peveril* had not been able to get in to northern Hudson Bay, because of the masses of ice. Mr. Ford and his family were faced with starvation, unless food could be got from Repulse Bay. He set out with four dog-teams on May 2, and made his way west of the Porsild Mountains to Duke of York Bay. He had with him as provisions, ten bags of flour, two hundred pounds of sugar, two chests of tea, and so forth; food for the dogs; and a very heavy boat. On each of the four sleds was loaded about half a ton of supplies. In each of the teams were seven or eight dogs. Several Eskimos went along as drivers. Progress was very slow, especially in view of the lateness of the season. He reached Repulse Bay on May 16, and remained there for five days. He finally got back to the Post by the first of June, with enough provisions to see him and his family through until the coming of the supply-ship in the following summer.

Since 1924 Mr. Ford has been to East Bay at least twelve times, and on some of these trips he went as far as Mount Minto. During April, 1928, he went to Cape Low by dog-team. While there he saw great nesting colonies of Lesser Snow Geese. During the course of his travels he determined many interesting facts about the Island. He learned, for instance, that the so-called boat-channel between White and Southampton Islands is navigable only at high tide, at least during certain seasons. He found that East Bay is indicated incorrectly on the extant charts, the head of the Bay swinging westward rather than southward. He also agrees with the Eskimos, that the coast-line in the Seahorse Point region, particularly near Mount Minto, is quite wrong on most, if not all, of the modern maps. He feels, however, that the Duke of York Bay region is correctly represented.

The chief servant of the Company's Post at Coral Inlet, a faithful and intelligent Eskimo by the name of Amaulik Audlanat (nicknamed "John Eli," after the famous pugilist, John L. Sullivan) was Mr. Ford's almost constant companion on most of his trips about the Island. Amaulik has made a good many trips by himself during the course of his hunting, and is the only man, so far as I have been able to learn, who has actually circumnavigated the entire Island. He is therefore probably better acquainted with the rough shore of Fox Channel from Cape Fisher northward, than any living man, and his comments on this country were very valuable to me.

Amaulik personally knew most of the men who have travelled about the Island in recent years and he helped many of them with their work. Among these were Captains Comer, Murray, and Munn, and Dr. Mathiassen. He helped me constantly in my hunting and exploring, and his comments on the maps made during my residence on the Island I considered of great value.

GEOLOGY OF SOUTHAMPTON ISLAND

It is obvious to one travelling over and about Southampton that the eastern part of the Island is very different in general character from the western part: the former being rough, rocky, and rather high; the latter tiresomely low and flat.

All the rough, eastern part of the Island is principally primitive or Archaean granite. I noticed a good deal of variation in color and composition of the granitic rock I encountered in travelling from the head of South Bay eastward, and the specimens gathered show differences of content, but the whole region, nevertheless, has much the same geological status. In speaking of the geology of the lands occupied by the Central Eskimo tribes, Mathiassen says (1927 a, p. 86): "Geologically speaking the territory is rather varied; low,

waving land, composed of primitive rock, forms the country south of Repulse Bay, the eastern part of Southampton Island [and] most of Melville Peninsula."

According to Low (1906, p. 190, etc.) this eastern part of Southampton, along with Coats, Nottingham, Salisbury, Charles, and Resolution Islands, the shores of the northwest part of Hudson Bay, and the southern shores of Hudson Strait are all composed of these Archean rocks. As regards Southampton he writes: "Crystalline gneisses, schists, and granites occupy the eastern and northern parts of Southampton, extending northward from Seahorse Point to Frozen Strait at the northern end of the Island. The rocks near the junction of the Archean with the Silurian at Seahorse Point are largely very quartzose, light gray mica-gneiss, associated with bands of rusty weathering, fine-grained mica-gneiss holding graphite in small flakes, the rusty color being due to the decomposition of small grains of pyrite disseminated through the rock. This rusty grain closely resembles that found in the vicinity of Cape Wolstenholme at the entrance to Hudson Strait, and both appear to be similar to the sillimanite gneiss of the Grenville series of Southern Canada. Both of the above rocks are cut and twisted by masses of a coarser granite-gneiss, pink to red in color, with pearly feldspar and smoky quartz. All are cut by dikes of feldspathic pegmatite containing much of the pearly feldspar."

Both W. E. Parry (1824) and Captain George Back (1836) as well as Mathiassen (*l.c.*) mention the granites and crystalline rocks, which they found in the Archean area to the northward of Seahorse Point. Eskimos brought me specimens from the vicinity of Cape Fisher and Duke of York Bay which appeared to be basically the same as those from the Seahorse Point region, which we there personally collected. In addition to these were some very interesting specimens of a mineral approximating lignite, which the natives found could be used as fuel, though it burned poorly and sputtered a good deal. Mr. Ford himself saw a good deal of this "coal," and told me of trying to use it without much success, while on one of his hunting expeditions to Mount Minto.

Among the lighter gneisses found at Seahorse Point many appeared to be garnet-bearing, the crystals not being of great size, but having a pleasing red color, which the Eskimos naturally looked upon with a good deal of interest. I found some rocks, in which there were considerable flakings and thin laminæ of graphite. The high cliffs at Seahorse Point were particularly interesting to study, for here the various strata could easily be inspected either from the base of the cliffs or from a high point opposite to them. Certain fibrous pieces, which we found, appeared to have the structure of asbestos-bearing rock.

The mineralogical material, which Parry brought back from his explorations of the west side of Fox Channel from Frozen Strait to Fury and Hecla Strait, were identified by Jameson; and since this section of the country is geologically much the same as that of the eastern part of Southampton, the results of his examination should be of interest here. He found among the prominent varieties of rocks from this region "granite, gneiss, mica-slate, clay-slate, chlorite-slate, trap, serpentine, limestone, and porphyry." In association with these he found the following minerals: "Zircon, beryl, garnet, actinolite, tremolite, diallage, coccolite, rock crystal, calc-spar, rhomb-spar, asbestos, graphite, specular iron ore, magnetic iron ore, chromate of iron, titanite iron, and common and magnetic iron pyrites."

In the western part of Southampton, the only hills which relieve the endless monotony are the few piles of gravel, which on some charts are called "peculiar shed-like hills" (Comer, 1910, p. 85) and which the Eskimos call *Noovoodlik*. Concerning this part of the Island Mathiassen says (1927 a, p. 86): "flat Silurian limestone country composes the western part of Southampton Island and a zone along the east coast of Melville Peninsula." Low

states (1906, p. 210): "Flat-lying beds of light-colored yellow and drab limestone occupy the lowlands of the southern and western parts of Southampton Island, and also form outliers in depressions in the crystalline rocks on the north side of the island, notably at Duke of York Bay.

"A considerable collection of fossils were brought home from the beds forming the southern half of the west coast of the island. These have been examined by Dr. Ami and Mr. Lambe. . . . The fossils show that the rocks contain a fauna closely resembling that of the Lake Winnipeg basin, and extend over a period from the Galena-Trenton to the Guelph and Niagara, or from the upper part of the Cambro-Silurian to high up in the Silurian.

"Soundings taken on the even bottom of Fisher Strait show that the limestones extend without a break to Coats Island . . . where they occupy all of its surface except the portion at the east end . . . where the Archaean ridge crosses it. A few fossils from Mansfield [Mansel] Island show that it also is formed of limestone of these horizons.

"At Cape Chidley [northeasternmost Labrador] a collection of fossils from loose pieces of limestone corresponds with fossils from Akpatok Island, and the direction of the ice movement out of Hudson Strait leaves little doubt that the loose limestone of Chidley came from that island. These fossils show a slightly wider range in age than the rocks of Southampton do."

This "Silurian limestone," which Low describes as "light-colored yellow and drab," is exceedingly difficult to walk upon. Broken up at the surface, as it is, into many-shaped chunks, in which little or no vegetation grows, it so rapidly wears out shoes, and in particular the Eskimo seal-skin *komiks* (boots), that it is almost impossible to keep on hand an adequate supply of foot-gear. I saw outcroppings of this limestone near Leyson Point; in fact the spectacular gorge, which the Anderson River has cut, has exposed about seventy feet of strata of this crumbling material; and the whole vast mound of Itiuaehuk is composed of it. Here, on a day's walk across what appeared to be a vast desert, I covered about eighteen continuous miles of rough, angular limestone blocks, in which scarcely any vegetation grew—not even moss or lichens of any size or refreshing color.

At several places along the southern coast this limestone deposit is high enough to form a sort of bluff, wherein waves or winds have worn out caves or great hollows. One such cave of rather gigantic proportions we found and entered not far from Seahorse Point. Here the limestone was somewhat mixed with what appeared to be granite and gneiss.

Unfortunately I am not able to offer any final remarks upon the composition of the "peculiar shed-like hills" of Captain Comer's chart. Natives who have visited, or hunted bears upon these *Noovoodlik*, and Mr. Ford himself, who has been to at least one of the hills, agree that they are in reality great heaps of gravel-like, somewhat slaty pieces of rock, and are not, as might be inferred from a distant inspection, great chunks of solid rock. They may be, in fact, terminal or abrupt lateral moraines.

Walrus Island, so far as I have been able to determine, is a mass of rock with structure and composition such as is found at Seahorse Point. The height and ruggedness of this island contrast markedly with the flatness of the limestone country to the westward of South Bay.

The most memorable formations I saw at Southampton were those in a limestone outcropping near Leyson Point. Here the bottom of one of the shallow bays (Whale Cove) was almost completely exposed at low tide and I frequently waded across it while hunting shore-birds. I found the entire area to be composed of symmetrically stratified limestone, which had the appearance of gigantic, petrified cabbage-heads, the great six-inch thick leaves of the "cabbage" having been worn down and broken up by erosion, exposing the

inner layers and "hearts" in a decidedly picturesque fashion. Such a tidal flat as this was exceedingly difficult to walk upon, since the angular, slippery faces of the rock were very treacherous, especially when partly covered with sea-weed.

The whole of Southampton was, of course, covered with ice during the glacial period. This is evinced by the striae, which may be found anywhere in those sections, where the bed-rock has held its original surface through the centuries. As regards this glaciation Low says (1906, p. 185): "The former presence of a continental ice-cap is attested along the north-western shores of Hudson Bay and in the southern part of Baffin Island, by the rounded and well polished rock surfaces, which are everywhere well marked by the ice striae, often in several sets showing changes in the direction of the ice movements."

During past ages vast changes have taken place in the region now occupied by Hudson Bay. Low, in speaking of the "western Cambro-Silurian sea," says (1906, p. 186) that this great body of water, which represented the "maximum encroachment of the northern ocean," "filled the present depression of Hudson Bay, and extended far to the south and westward of its present limits, outliers of limestone containing fossils of this age, and very similar in mineral character, being found in the valleys of the great lakes of Manitoba. From Manitoba these rocks have been traced southward into the United States, so that at the time of their deposition the Cambro-Silurian Sea occupied a great basin open to the Arctic Ocean and extending southward into the middle of the continent."

With the rising of the land, this great sea gradually receded. Due to the great lapse of time and to the eroding of the thick ice-cap in more southern regions it is difficult to trace the shores of this sea as it receded; but it was probably at about this time that much of Southampton appeared above water. At least the western part of the Island had been under this sea long enough to permit great deposits of sediment, in which fossil remains were preserved. Southampton apparently has not been submerged since that era.

Regarding the Glacial Period Low writes (1906, p. 188): "The conditions of the land and water surfaces during the glacial period differed little from those at present, except that there has been a considerable uplift of the land, as proved by the marine terraces found along the coasts. . . . The almost equal rise of land throughout the Arctic Islands is an argument against the subsidence of the northern lands being due to the burden of the ice-cap, and the subsequent uplift due to the disappearance of that burden."

Authorities appear to agree that the gradual flow of the ice-sheet in the Arctic Archipelago was to the northward. Dawson writes (1886) "Along the Arctic coast . . . there is a considerable volume of evidence to show that the main direction of movement of erratics was northward." Tyrell's observations (1897) on the glacial phenomena of the Barren-Land region west of Hudson Bay show that the country there was intensely glaciated; that the centre of glaciation was on a nearly level plain now elevated some 400 or 500 feet above sea-level, there being no evidence to show that it was much more elevated during the period of glaciation. "The centre of ice distribution was situated close to the western shores of Hudson Bay . . . somewhere to the north and west of the head of Chesterfield Inlet. . . . As the glacier diminished the centre moved nearer the seashore, and the final stage was probably represented by the ice-cap breaking up into a number of distinct glaciers, each with a local movement of its own."

Certain of these "distinct glaciers" probably moved across Southampton; and some of them may finally have lodged there, as they subsided depositing such moraines as the hills called *Noovoodlik*, the great gravel-plateau ridge at Itiuchuk, the spectacular gravel-heap at Native Point, and similar deposits elsewhere.

Low says (1906, p. 233) that "there is a great difference in the evidence of the intensity of glacial action between the southern regions and the eastern and northern portions of the great area embraced in this report. On the shores and islands of Hudson Bay and Hudson Strait the crystalline rocks have been denuded of every trace of rotted surface material; they have been smoothed, polished and intensely striated, and their present condition is such that little or no change has taken place since the disappearance of the ice which once covered them deeply, the striae being so fresh as to appear of the formation of yesterday."

There are on Southampton certain clam-shell deposits and "raised beaches," which suggest recent rising of the land. Low, however, states (1906, p. 275) that "the uplift which took place in comparatively recent times, geologically speaking, does not appear to be going on at present, as all the historical evidence relating to the Hudson Bay region points to a remarkable stability in the coastal regions from the time of the first records dating back to the voyage of Munk in 1619."

PRESENT DAY EROSION AND GLACIATION

In the high, rougher, Archaean part of Southampton, erosion appears not to be going on very rapidly today. The rocks are worn down by action of wind, rain, waves, and frost; but the granite is durable and it presents a bold, time-smoothed surface to the elements.

The gorge of the Anderson River, on the other hand is composed of rock, which is so broken up, probably due principally to the action of the frost, that large and small chunks of rock are constantly falling from the walls during summer, rattling down the talus slopes at the foot of the cliffs, or splashing into the water. I did not permit myself to investigate any of these cliffs very extensively for fear of starting an avalanche of some sort.

Along the southern shore of the Island, especially in the region of Seahorse Point and to the west of Munnimunnek Point are caverns, which appear to have been formed as the result of wave action.

All through the section of Mount Minto and along the shores of Fox Channel there are extensive snow-banks, which never entirely disappear throughout the course of the year. Such snow-banks are to be found also at Itiujuaq, not more than twenty miles from the Post at the head of South Bay. One of the most interesting spots I examined was the large snow- or ice-bank east of Cape Low, which could be seen plainly three or four miles from the shore, and which was, according to Mr. Ford, about nine hundred yards wide, and which extended for some distance inland. This bed of snow-ice had much the appearance of a glacier to me, though it could hardly have been a *river of ice* in view of the flatness of the country.

CLIMATOLOGY

Travellers, who have written of their journeys across and about Southampton, agree that the weather is inhospitable and rough, and that the winters are cold. Parry, Lyon, Back, Rae, and Middleton all speak of the winds and storms, the ice, fog, and cold weather, which they encountered in Fox Channel, Sir Thomas Roe's Welcome, and Frozen Strait.

Mathiassen (1927 a, p. 86) says of the climate of the country of the Igloolik Eskimos, in general: "The climate is very severe with ice- and snow-covering during 9-10 months, winter mean temperatures of $\pm 35^{\circ}$ - 40° C. and prevailing northern winds with drifting snow. Extensive floes of smooth winter ice are found in Repulse Bay, Furey and Hecla Straits, and the inlets of northern Cockburn, and besides there is nearly everywhere found a narrow coast-floe."

I did not keep a year-round record of the temperature, either of the atmosphere, or of the sea-water, during 1929 and 1930. I did keep atmospheric records during most of the winter, however, and these proved to be not nearly so low as I had expected them to be. Mr. Ford told me that the winter was an unusually mild one, but that it was also unusually long, so that spring was greatly delayed.

The Eskimos recognize four, and perhaps more, seasons. Winter they call *Ookiuk*, the 'time when everything is frozen, when there is frost hanging in the air, and when the water of the sea steams.' Spring is called *Oopungakshuk*, the 'time when the first little birds arrive from the south.' Summer is known by two names, *Oopunjak*, 'Mosquito Time,' and *Aujak*, the 'time of the nesting birds.' Early fall is known as *Ookiukshak*, the 'time of the first snows and the migrating of birds.' Late fall, according to Peck, is called *Ookiak* (almost the same word as for winter) the 'time when the islands in the bays freeze shut.'

For convenience, I have decided to treat of the weather and temperature month by month, beginning with the dead of winter.

JANUARY

The Aivilikmiut call the month of January *Koobloot*, the time when "the ground cracks, making a loud sound." By the first of this month the shortest days have passed, of course, but winter holds the Arctic in an icy grip. The tundra is covered with snow varying from a blanket over the grassy prairies a few inches thick, to great drifts along the edges of the ridges, or in the gulches fifteen to twenty feet deep. All the streams are frozen shut, and their courses and banks are so buried under the snow that it is difficult to follow them. Even the largest lakes are frozen, the shallower ones a solid mass of ice to the very bottom, others, wherein dwell handsome land-locked Salmon Trout, sealed shut with a shell of ice from four to eight feet thick. Even the bays, fjords, and inlets are frozen shut, and the salt-water ice is covered with a foot or so of snow. Since these bays never freeze solidly to the bottom, the tides continue to come and go, with the result that the shore is lined with boldly broken up cakes of ice, some of them as big as houses, through which it is very difficult to journey with dog-team and *komatik*.

Due to the almost constant wind, which is usually from the north or northwest, the snow is mostly packed down firmly, so that it is possible to walk with some comfort over the tundra without using skis or snowshoes. I never once used any special foot-gear, except Eskimo boots, in walking about through the dead of winter, and I frequently covered from six to fifteen miles a day.

At this time of the year there is comparatively little daylight, of course. The sun rises in mid-morning, and after making its way through a short arc not far above the horizon, sinks from sight in mid-afternoon. Southampton is not quite far enough north for perpetual night during winter, but the days are short. Even at night, however, the tundra is rarely really dark, for the snow reflects the starlight and moonlight, and the brilliant aurora-borealis.

The temperatures at this time of the year are sometimes very low. During the first week of January, 1930, the thermometer stood most of the time at about -30° F. It was warmest during the middle of the day, of course, when thermometer readings were usually made. By three o'clock in the afternoon it always became colder. On January 5, it was -50° F. at about ten o'clock in the morning, and it got no warmer all day. At about noon a brisk wind sprang up, and the weather was bitterly disagreeable. I badly froze my nose,

cheeks, forehead, and chin. At this time of the year, when the wind came up, the loose snow everywhere began to drift, giving to the landscape a very dreary appearance.

At this time there were very few birds to be seen anywhere. Occasional flocks of Rock and Willow Ptarmigan were to be seen near the Post, and now and then a Snowy Owl. In the region of Seahorse Point ravens flew about now and then. In the open water of Hudson Bay, several miles out from the southern shore of the Island, and nearer at hand along the Fox Channel shore, some water-birds were to be seen, Mandt's Guillemots, Brännich's Murres, and occasional eiders and gulls. Inland the Arctic Hares and Barren Ground Caribou lived on the lichens and moss, which they pawed up from the snow; lemmings ran about and nested in their endless burrows under the drifts, eating bark from the willow-twigs and seeds of grasses and plants. The numerous Arctic Foxes and Weasels, on the other hand, lived almost altogether on the lemmings, digging them from their burrows, or catching them in their warm grass nests. Arctic Wolves preyed upon the caribou herds in the region of Duke of York Bay and now and then wandered through the southern part of the Island wreaking considerable damage among the fox-traps wherever they went.

A good deal of snow falls during an average January, but the wind is so constant that this snow rarely becomes very deep in the open country. It is so cold that the water of the inlets, which seeps up through the broken ice at high tide, steams as if it were boiling hot, a weird sight indeed. Since the pelts of the foxes are now prime, the natives follow their trap-lines everywhere, moving about in luxurious ease on their dog-sleds.

There is occasionally a mild spell during January, when it may thaw for a time, or even rain. Such rain-storms occurred during the latter part of January in 1929. In 1930 the thermometer never rose above zero to the best of my knowledge during the entire month. The average temperature for the month was -32° F. The lowest temperatures were recorded on January 5 and 8 (-60° and -43° respectively) and the highest on January 11 and 27 (-16° and -3° respectively). On the "warm" days the wind was from the East; at other times the wind was almost invariably from the north or northwest.

During January, 1929, the thermometer stood below zero on twenty-eight of the thirty-one days. The average temperature for these days was -28° . The lowest temperature was reached on January 9, -60° . On the 26th, 27th, and 28th, the thermometer stood at $+32^{\circ}$, $+32^{\circ}$, and $+30^{\circ}$, respectively, and there was considerable rainfall. On the 29th the weather became cold again, with a temperature of -8° .

Unfortunately no definite records of temperatures were kept during earlier years (1924-1928) at the Post, so we have no other records to offer from Southampton Island. Dr. John Rae, however, kept some records during the winter of 1846-47, while he was in the Repulse Bay country. He states that it was "very cold" during January, 1847, that it was -47° on January 7, and -72° on January 9.

FEBRUARY

The Aivilikmiut call this month *Ahvoonik*. This word signifies that the period lies between the "times of extreme frost," *i.e.* January and March. The weather is much the same as in January, the wind continuing principally from the north and northwest, and snow falling now and then, but rarely having any opportunity to form deep drifts, because of the wind. The days gradually become longer, of course, and the sun brighter. By the end of the month many of the days are bright and sparkling as in the finest March weather.

The edge of the coastal ice-sheet does not recede landward during this month, for the temperatures continue to be low and the wind does not blow chunks of ice in from the south

and west to break up the ice-edge or *sheenah*. There is no change in the mammal- and bird-life, unless there happens to be an unusually mild spell, when water-birds sometimes move northward, or inland.

During February, 1930, we had wind almost every day, and the thermometer never rose above zero. However, the average temperature for the month was somewhat higher than for January, being -28° . The lowest temperatures were recorded on the 4th (-40°) and the 15th (-43°). The warmest days were the 6th (-6°) and the 26th (-6°). On the 25th and 26th there was a strong southwest wind, which probably blew in enough pan-ice to break up and eat the edge of the solid ice-sheet south of the Island to some extent. During the middle of the month there were several fine, bright days.

During February, 1929, the thermometer never rose above zero. The average daily temperature was -24° . On the 16th and 17th it was only -2° , these records raising the average temperature up from -27° . The thermometer stood at -55° and -60° on the 24th and 27th respectively.

MARCH

The month of March is called *Netchialut* by the Aivilikmiut. *Netchek* is the name for the common Ringed Seal, and it is during this month that most of the young *Netchek* are born.

As a rule, March is a gloriously bright, sparkling month. The days have become gradually longer, and the sun considerably warmer. During this month there is likely to be a good deal of snow-blindness among the Eskimos, for the glare of the reflected sunshine from the smooth snow and ice is terrific. By this time a few redpolls return from farther south. The Arctic Hares spend much of their time running along the rough ice at the edge of the frozen inlets, lying down and basking during the warmest part of the day. It is, however, still too early for the mating of ptarmigan or Snowy Owls, for spring has not yet really begun.

During the fine weather of March the sun often rises with a glorious effusion of color; and sometimes the great day-star is accompanied by two mock-suns, showing shafts of light reaching upward toward the zenith in brilliant bands. The wind is not yet frequently enough from the south to induce any considerable wearing away of the edge of the floe, but the sun is sometimes so warm as to melt the crust of the snow in sheltered places enough to give it an icy glare by evening.

During March, 1930, there was a good deal of fluctuation in temperature. The average of twenty-three days of the thirty-one (records were not taken every day) was -7° . From the 19th to the 26th, the weather was mild continuously, the thermometer lingering about $+20^{\circ}$ or $+30^{\circ}$ nearly all day, so long as the sun was bright. The coldest temperatures of the month were recorded on the 1st (-38°) and the 8th (-34°).

During March, 1929, the thermometer stayed below zero all month, with an average temperature of -18° . It was coldest during the first week, and warmest on the 16th, when the thermometer stood at -6° . In the official Post diary, fifteen days were recorded as "calm," fifteen were "drifting," and one was called a "light wind" day. Not much snow fell.

During March, in 1925, a very low temperature was recorded on the 14th (-50°); and during the winter of 1925-1926, the "worst blizzard of the season" occurred on and about March 5.

APRIL

Among the Aivilikmiut the month of April is known as *Terrighulliut*, the time of the year when the baby Square-flipper Seals (*Oogjook*) are born.

Spring commences in April. During this month, at some time or other, the forerunners of the big flocks of Snow Buntings arrive, and other stray small birds appear now and then. The sun is now so warm that the crests of the snow-drifts melt a little nearly every day, the water trickling into tiny pools in the rocks, where it freezes by evening. The willow-buds, which protrude here and there from the snow if they have been spared by the ptarmigan and hares, begin to show a little color on the warmest days, for the sap is beginning to creep up through the roots from the humus beneath the solidly frozen crust. The numerous tracks of the hares, which cross and recross everywhere along the edge of the salt-water ice, show that these animals are beginning to mate. Even *Ookpikjuak*, the Snowy Owl, may be heard hooting an early love-song. A good deal of snow falls, and there is much wind, but many of the days are fine and splendid for travelling with the dog-team.

During April, 1930, the weather was changeable. There were many violently windy days, others beautifully calm. Upon the whole not much snow fell. The average temperature of twenty-eight days was $+4^{\circ}$ F. The warmest days of the month were the 20th and the 24th, when the thermometer reached $+30^{\circ}$. The coldest days were during the earlier part of the month, when -6° was reached on two dates.

During 1929, the lowest temperatures were recorded on the 4th (-25°) and the 8th (-15°). The weather was very variable. The thermometer stood below zero on twenty-two of the thirty days; toward the end of the month, however, there was a mild spell. From the 25th on it never became colder than $+20^{\circ}$ and it was as warm as $+30^{\circ}$ much of the time during the middle of the day. According to the official diary of the Hudson's Bay Company there were only six calm days during the month; on eleven days it "drifted a little"; on seven days there was "hard wind"; and on six days it snowed, though on the whole there was not much snow. A good deal of the wind was from the south and southwest; on three days there was north wind, and on five days northwest wind. There was no east wind during the month.

MAY

The Aivilikmiut call the month of May *Nukalliut*, the time when the Barren Ground Caribou fawns are born.

By this time the days are so long and the sun so bright, when the weather is clear, that it would seem that summer ought to be at hand. But the snow lingers and the wind continues to be cold and blustering, so that the visitor from the Southland is wont to wonder whether winter will ever be over. Snow Buntings usually become fairly common before the end of the month, and others of the small birds return. Since there is a good deal of rough weather and wind from the south and southwest, the edge of the solid ice-sheet in the bays and inlets gradually recedes landward. The lakes are not yet thawing, however, and the salt-water ice, covered as it is with snow, shows no sign of breaking up. To all appearances it is the dead of winter. Yet the occasional brown feathers one sees on the head of the Willow Ptarmigan, the little tricklings of water on the ridges, where the sun warms the rocks and melts the snow, the increased swelling of the willow-buds, and the gradual baring of patches of brown grass, where the snow was never deep and where the sun has had a chance to melt away the thin crust, all suggest that spring is advancing and that summer will come someday. Some of the wildest blizzards of the year, and assuredly some of the heaviest snow-falls, are likely to occur in May. Sometimes the winter passes before the end of the month in a wild storm; but usually we must wait until June for the drifts to disappear and the flowers to come.

During May, 1930, the thermometer never dropped below zero during the day, though it usually became considerably colder at night. The average temperature for the month was $+21^{\circ}$. The coldest temperatures were recorded on May 14 ($+8^{\circ}$) and May 16 ($+6^{\circ}$). During the warmest part of the day the temperature rose to above freezing many times, notably on May 18 ($+36^{\circ}$ in the shade) and during the last three days of the month ($+34^{\circ}$ in the shade). On May 8 (thermometer $+20^{\circ}$ at the Post) we heard thunder at the floe. On May 25 the first nest of a Snowy Owl was found. Before the end of the month "rock-flies" and "snow-spiders" were seen on several occasions. On the last day of the month I noted in my diary that the "snow was settling down rapidly."

During May, 1929, no thermometer readings were taken the first week, though the weather was recorded as "mild." During the middle of the month the thermometer dropped to below zero, the lowest record (-15°) being made on May 25th. During the last five days of the month the weather became milder again, the thermometer standing at from $+20^{\circ}$ to $+30^{\circ}$ in the shade. A great deal of snow fell during the month, five- and six-foot drifts forming on the 2nd and the 8th. According to the diary there were only seven calm days during the entire month. For the rest of the time there was a good deal of strong wind, most of it from the northwest. There were three days of east wind, accompanied by cloudy weather.

There is, of course, a good deal of annual variation from year to year during this month. For instance, on May 24, 1928, according to the official diary of the Post "the lakes were thawing." On May 1, 1927 "the first water was noted on the lakes," and so on.

JUNE

The Aivilikmiut call the month of June *Munniliut*, the 'Egg Month.'

June in my opinion is the most interesting month of the year in the North Country. After the wild days of latter May, the sun comes out in earnest; the deepest drifts sink away, as if they were being sucked bodily into the ground. The lakes everywhere thaw rapidly. The tops of the ridges suddenly become bare and the open prairie country emerges from its gray-white blanket. The melting of the snow means that water must collect somewhere in the valleys. Much of it runs into the lakes. Some of it, however, makes its way to the streams, and eventually wanders down to the sea to eat deep channels in the rough salt-water ice, and eventually to form great lakes and pools all along the shore. When the snow really begins to disappear, the birds return on all hands. When the lakes have become open, King Eiders and Old-squaws and noisy loons make their way inland and set up their incessant courtship cries. The world is transformed, within a week or two, from a silent, frigid expanse, to a place of amazing activity and noise. Everywhere the sounds of the mating birds mingle with the cracking of the ice along the shore and on the lakes, the roaring of the swelling streams, and the laughter of the Eskimo children, who are glad to see the winter die. Lemmings come out from their flooded burrows and bask in the sun by the score, their plump little bodies sometimes covering the tops of the stones. By this time the foxes, hares, and weasels are parti-colored, and often they are in oddly poor pelage, as if they had run through a fire. Soon the flowers begin to appear, first a small, purple bloom, which clusters all over the tops of the ridges, then later the white-petalled, pretty *Dryas*, yellow buttercups, and dozens of other kinds. The green grass shoots up; the willow-catkins expand and droop; and the bumblebees and butterflies wander about. So much is going on and so much is to be done that it is difficult to sleep. The sun is in the sky almost all day; even

when it sets, its light is so strong that the world never becomes really dark, though to be sure, this is not the "land of the midnight sun," strictly speaking.

At this time the Eskimos spend much of their time hunting for seals and walrus; and they make expeditions to the islands where birds are nesting, for they are eager to gather the fresh eggs. Though the streams continue to pour their muddy torrents into the sea, and though great chasms are by this time dug through the saline ice in all the coves and inlets, yet the great masses of ice continue to hold together, making it impossible to use the canoes or motor-boats to any extent. However, the natives do not hesitate to drive their dog-teams over the rotting ice, though they sometimes encounter grave difficulties at the mouths of streams. During some of our June expeditions our *komatik* sometimes went through water three or four feet deep. Sometimes the dogs had to swim. It was not pleasant business.

During 1930 the first four days of June were a continuous gale, one of the worst I ever experienced. The direction of the wind changed many times, though it was usually from the east. Snow fell and drifted almost constantly. It was impossible to see more than a few rods from the windows at the Post. We all had the feeling that winter would never pass. The temperature was not low, however, the thermometer standing at from $+28^{\circ}$ to $+36^{\circ}$ most of the time during the day. On the 5th, the wind ceased and the sun came out, but there was no thawing of the lakes or bays. On the 7th it was foggy all along the edge of the floe, but the day was fine inland, and much thawing took place, enough to cause many large pools of water to collect along the tops of the ridges among the boulders. On the 8th there was a little rain and two flashes of lightning with some low, distant thunder. On the 14th it rained a little and later snowed, but the snow melted almost as fast as it fell. On this date I noted that the ice of South Bay was covered with from one to five feet of water which gave the whole expanse a beautiful blue color. Within a day or two this surface water drained off leaving the ice much the same in appearance as it had been during the winter. On the 17th, I got soaking wet crossing a turbulent stream, which I thought would not be very deep, but which proved to be terribly swift and treacherous. I had to swim to get out; got all my equipment, including a camera, wet; and nearly lost my shot-gun. On June 20, I wrote in my diary "warmest day of the season: in fact it was almost enervating." I did not see a thermometer on this date. There were some windy, rainy, and foggy days, but the sun shone most of the time and the weather was, for the most part, delightful.

For some reason or other, perhaps because the season was so dry, we had very few mosquitoes during the summer of 1930. Not once during June was I really bothered by the insects. During 1928, however, mosquitoes were noted in the Post diary as "bothersome" on June 26. I think the season must have been rather early that year, for the ice of the cove was "breaking up" on June 9 and "getting rotten" on June 22, while in 1930, the ice of the Bay was in good condition for the most part until the end of the month. Mr. Ford told me that he considered the 1930 season unusually late.

JULY

The Aivilikmiut have two names for this month: *Kittuailiut* or 'Mosquito Time,' and *Shughuliut*, the "time when the caribou hair is shortest."

July is the summer month. It is at this time that the flowers open everywhere, giving to the ridges and prairies bright colors they have at no other time of the year. Mosquitoes, save during unusual seasons, emerge from the shallow lakes and fly about in untold millions, a scourge to man and beast alike; butterflies twinkle about among the flowering legumes,

dropping to the ground the moment the sun goes under a cloud. By this time much of the noise of courtship among the birds is over. The duties of family life are urgent. Food must be gathered for the clamorous young.

The last of the ice disappears from the lakes under the spell of the July sun; and sooner or later, even the great mass of ice in the wide bays breaks up and drifts out to sea most of it never to return. Snow may fall at any time; but for the most part the weather is genial, and sometimes it is wonderfully pleasant. Rain may fall and fog gather along the shore; but as a rule it is not a month of savage wind.

During 1930, we had a good deal more "gray weather" than usual. For days at a stretch we would sometimes hardly see the sun. On the 5th, mosquitoes were somewhat bothersome, as I crossed some of the sheltered marshes, but it was usually too chilly and cloudy for them to be much abroad. By the 12th the ice of the Bay was so rotten and broken up, that there was an open channel from the Post extending southward to Bear Island. With the breaking up of the ice, the handsome and delicious *Ichalook* or Salmon Trout, made their way into the coves and inlets and the natives began to put out their nets to catch them. On the 13th and 14th it looked very much as if the ice in the Bay were going out for good, but the wind changed and blew it all in again, closing the channel which had opened to Bear Island. On the 15th we awakened to find that every vestige of ice in the whole of South Bay had gone out during the night. When the ice thus leaves, the Eskimos feel that summer has really come.

The latter part of the month was disappointingly cold and cloudy. The last three days were wet and windy, and decidedly unpleasant.

I was interested to find, upon consulting the diaries of the Post, that the ice evidently goes out of South Bay at about the same time every year. In 1925 it went out on July 12; in 1926, on July 11; and in 1927, on July 8. The very day the ice goes out of South Bay, walrus-hunts are organized, and canoes and motor-boats make their way out after seals. If any long trips are to be made, they are begun at about this time. During the summer of 1930, Muckik and his family made their way across the sixty mile stretch of water of Sir Thomas Roe's Welcome to the region of Chesterfield Inlet, to get for his son, Kooshoak, a wife, who had been betrothed before her birth.

AUGUST

The Aivilikmiut call August the Month of Young Ducks, *Mittiadiut*. This name describes the season very well, for every lake at this time has its families of loons, gulls, ducks, or geese. Most of the adult birds are undergoing a post-nuptial moult, which renders them relatively inconspicuous. During this month a good deal of migratory movement is to be observed among the shore-birds. Whether these birds are making their way south after their nesting duties are over, or whether they are non-nesting birds which are wandering about, it is not possible at present to say.

The Eskimos during August capture a good many *Kellilughak*, or White Whales, as well as seals and walrus. Their trout-nets, too, are out in the coves and at the mouths of the streams, and they capture a good many fish. Flowers continue to bloom throughout most of the month, and on the warmest days butterflies and other insects of a good many kinds are to be seen until about the 15th.

During August, 1929, the first frosts of the fall season were noted on the morning of the 29th. On this date deep mud along the margins of some of the lakes was so firmly frozen that I could walk on it. During 1929 and 1930, I noted no snow-fall during August, though

Mr. Ford told me that snow might fall at this time, just as it may at any other time of the year. August is likely to be windy and rainy. On August 4, 1925, there was "heavy rain with thunder" according to the Post diary. During 1929 and 1930 I did not keep any careful record of the temperature.

During the latter half of the month signs of fall are to be noted everywhere. The leaves of the tiny shrubs turn yellow or scarlet, giving a brilliant sparkle to the otherwise sombre tundra. Mushrooms are to be seen everywhere, instead of flowers. Birds have given up their singing for the most part, and many of them are banding together for migration, or passing through the latter stages of their late summer moult. Since the days are only rarely fine, the sky is usually gray and the lakes and sea of a monotonous shade of gray or gray-green, inhospitable, and unfriendly in character. The wind and rain are chilly and unpleasant.

SEPTEMBER

The Aivilikmiut have two words for the month of September: *Akudligut*, the "time when the caribou hair is half-grown"; and *Miyuakvik*, the "time when the fish go up the brooks."

September is usually an unpleasant month. The days are more than likely to be wet and chilly. There is much fog and rain. Snow usually falls several times during the course of the month, though it rarely becomes very deep.

During 1929, we had our first snow of the fall on September 11. The snow was not deep and it melted quickly, but it snowed quite hard for three hours. On September 18, we had several wild flurries, but the snow did not remain on the ground very long.

The first heavy snows of the fall usually come in September. In 1924 the first such snowfall came on the 15th; in 1925 on the 9th; and in 1926 on the 14th; though during 1927 no heavy snow-fall occurred prior to the first of October. Heavy frost nearly always comes in this month, so that by the first of October most of the lakes are usually frozen over, though the bays and inlets are usually still open. During 1926 the "lakes were all frozen" by September 28; during 1925 there was "ice on the lakes" on September 20. Frequently, however, the freezing over of the inland bodies of water does not take place until some time late in October.

OCTOBER

Among the Aivilikmiut October is known as *Nooliakvik*, the time when the caribou mate.

October is a wintry month at Southampton. By the end of September nearly all the small birds have left and the bright colors of the fall season have faded. Snow falls frequently, so that by the 15th the country has taken on a white and wintry appearance. The largest of the lakes are all frozen by the middle of October, and the bays and inlets themselves usually have a firm coating of ice, though the Eskimos do not usually trust themselves to journey across the salt-water ice until it is quite firm. Though it gradually gets colder as winter approaches, many of the October days are fine and bright so long as the sun is out. Wind is usually from the north and northwest.

During October, 1929, I did not record a single temperature above freezing. The coldest day of the month was the 26th (temperature $+2^{\circ}$); the warmest days were during the first two weeks when $+28^{\circ}$, $+30^{\circ}$, and $+31^{\circ}$ were recorded upon several occasions. Toward the end of the month there was a good deal of variation in the temperature. The average temperature for sixteen days was $+20^{\circ}$.

The waters of South Bay always freeze shut sometime during October. During 1925

the cove near the Post was said to be "full of ice-slob" on October 14, and it was solid two days later. On October 8, 1925, South Bay was "frozen solid." On October 28, 1926, there was a "thin sheet of ice across the harbor." On October 13, 1927, the Bay was frozen shut. During 1929, the season was apparently later than usual, for the waters of the cove and Bay did not start to freeze until October 27. Occasionally there are mild spells in October, as in 1924, when they had a week of "melting" weather from October 12 onward.

Though considerable snow falls during October, the natives do not usually undertake their long *komatik* trips until later in the season.

During 1846, the highest temperature recorded at Repulse Bay by Dr. John Rae was $+38^{\circ}$, the lowest $+15^{\circ}$. On the whole this was not very cold weather.

NOVEMBER

The Aivilikmiut call the month of November *Khianguliut*, the time when ice forms all round the shore.

Most of the bays and inlets freeze solid during the month of October. In November, however, the sheet of ice spreads out considerably, usually forming a more or less unbroken band all about the shore, sometimes for a distance of eight, ten, or twelve miles out, depending on the stillness of the weather and of course on the lowness of the temperature. Ice rarely forms for any distance eastward along the shore of Fox Channel. There is not usually a great deal of snow during this month, but there is much wind, so that drifts are formed everywhere in the rougher country, drifts where the Polar Bears may find a snug retreat, in which to hibernate during the coldest part of the season. By this time the foxes, weasels, hares, and ptarmigan are again in their white, winter-coats, and the caribou are much whiter than they were in the summer. Practically all the migrant birds have passed to the southward before the first of November, though an occasional redpoll, Snow Bunting, or White Gyrfalcon may linger until later in the season.

During 1930 the month of November opened with rather mild weather, the first three days having a temperature of $+10^{\circ}$, $+9^{\circ}$, and $+10^{\circ}$. There was then a sudden drop to -20° , and the thermometer did not rise above zero again throughout the month. The average daily temperature for the month was -20° . The warmth of the first three days of the month raised this average considerably, and without these three days the average would have been -24° .

On November 5, 1925, there was such a strong southwest wind that the ice of South Bay, which had formed rather solidly some time before, was considerably broken up. As during other portions of the winter, there are occasional mild spells during this month, but such spells are not usually of very long duration.

During November, 1846, Rae recorded the following temperatures in the region of Repulse Bay: highest for the month, $+28^{\circ}$; lowest for the month -25° ; and the mean temperature $+0.68^{\circ}$.

DECEMBER

The Aivilikmiut call the month of December *Akjuk*. This is the name of one of two stars, which are to be seen clearly at this time of the year just before dawn. The Eskimos say that, when these two stars are seen together just before dawn, the days will soon begin to lengthen again.

December is a cold month. The days gradually become shorter and shorter, until on the 21st the sun rises at about 10 o'clock in the morning and sets at about 1 o'clock in the after-

noon, passing in the meantime through a short arc but a little distance from the horizon. This is the winter season, *Ookiuk*, when there is much frost every day, and when the world is very cold. The *Eeveetaghuk*, or land-locked Salmon Trout are in the bottom of the deepest lakes swimming slowly about under the ice. There are few birds anywhere, only Rock and Willow Ptarmigan, Snowy Owls, and inland an occasional raven. Along the distant edge of the floe there may be many Mandt's Guillemots and some Brünnich's Murres, but such water-birds are to be seen only by hunters, who go out after seals and walrus.

During December, 1929, I took temperature records on only twenty-three of the thirty-one days. The average temperature for these days was -29° . The thermometer never rose above zero during the entire month, though it did not fall below -40° . On the 13th, 14th, and 15th, it rose as high as -6° and -8° . These high temperatures raised the average of the month considerably. There was a good deal of wind from the north and northwest, so much in fact, that Mr. Ford was wont to refer to Southampton as the "home of the winds." Not a great deal of snow fell, but snow was in the air much of the time, because it was so constantly being drifted by the winds. We had no foggy days during the month.

During 1928 the month of December was warmer on the whole than in 1929. The thermometer stood below zero most of the time, though temperatures around $+10^{\circ}$ were recorded on the 11th, 17th, 18th, 19th, 27th, and 28th. On the 7th and 23rd the coldest temperatures were recorded, -30° . During December, 1924, there was a mild spell (actual temperatures not recorded) during the second week. In the Post diary the weather was recorded as "mild, with wet drifting."

ETHNOGRAPHICAL

THE ESKIMOS OF SOUTHAMPTON ISLAND

THE EXTINCT SAGLERMIUT

The Eskimos who formerly inhabited Southampton, according to those who have studied their culture, were a specialized, rather unique tribe. They were known as the Saglermiut or Sadlermiut (Comer, 1910, p. 87), Sadlermio (Mathiasen, 1927 c, p. 222), or Sead-ler-mee-oo (Munn, 1919, p. 54). Other spellings of the word have doubtless appeared. Following the pronunciation of the Aivilik Eskimos themselves I should write it *Shuglukmiut*. The suffix *miut* means 'people' or 'tribe.' The first part of the word, according to Mr. Ford, is a widely used native name for the Island, meaning, perhaps, 'a flat place' or 'a flat island.' As to the etymology of the word I have found no comment in the literature at hand.

The Saglermiut were apparently never very numerous. We have no record establishing their rate of increase or decrease in former years, but it is easy to believe that even some time prior to the coming of the scourge which exterminated them, they were little more than holding their own. They died out in 1902, as a result of some infectious disease, against which they had built up no racial resistance. It is thought by some that a few individuals of the tribe still live, but I do not know that this belief can be proved; and, even if such individuals do live, they have long since been assimilated into some other tribe. The last stronghold of the Saglermiut was at Native Point or Tunirmiut (see Mathiasen's map, 1927c, p. 328), a peninsula or point about thirty-five miles southwest of the head of South Bay.

The Saglermiut evidently inhabited Southampton for a long time. According to

Mathiassen (1927c, p. 222) the first explorer to come in contact with them was Captain G. F. Lyon, who wrote in the record of his voyage a very interesting account (1825, pp. 56-64) which is illustrated with a most attractive drawing, which Lyon himself made, of "A Native of Southampton Island" sitting on a sort of raft of inflated sealskins.⁷

There is scarcely room here for any detailed discussion of Captain Lyon's comments upon this now extinct people. It is extremely interesting, however, that he noted hearing the word "Kooyenna (thank you)" in August, 1824 (1825, p. 57), in view of the fact that a word which is very nearly identical, is widely used among the distinctly different tribes, which today inhabit the Island. I refer to the word *Kooyanna* or *Kooyannamik*, which now is constantly used as an expression of gratitude.

In 1865, according to Boas (1888, p. 451), "an American whaler" again encountered the Saglernmiut at Manico Point. But our chief source of information concerning these interesting people is Captain George Comer, who was associated with them from 1896 to the very year they disappeared, who became well acquainted with their way of living, and who excavated at points where they had lived, bringing to light much interesting and valuable ethnological material. Captain Comer has most generously sent me his personal note-books, wherein appear such interesting accounts of the Saglernmiut that I desire to quote from them here, rather than from any of the more elaborate treatises, which have been published, and which, though perhaps more finished in detail, are certain not to possess the fresh authenticity of notes of this sort. The account, in part, reads as follows:

"I first landed on the Island in 1896 (July 14) at Cape Kendall, a little to the East on [the] south shore [of the Bay of God's Mercy] where we found the remains of old stone igloos.⁸ The stones, being large and flat made it easy to build very good foundations and . . . the roof had been formed by placing whale ribs with turf [on them]. . . By lifting up [a] stone in the floor [a] quite large, box-like place was seen which was probably used for meat and clothing. Also there were lockers⁹ at the side. Nearby were graves. One foundation had an entrance built of large flat stones . . . about 15 feet long. There were also, nearby, large caches about six feet high.

"We landed next day at the Bay of God's Mercy where we saw some whale bones standing up at a cache.

"On opening the cache we found a number of small birds were stuck on sticks, skinned. Also other meat.

"We took the whalebone, about 50 lbs., left a knife and needles [in exchange] but could find no natives. The next day we landed on the south side of the Bay on Manico Point. Here we found the land much higher, and little or no vegetation, but signs where the natives had camped with skin tents. . . Along this shore to the southward are many snow-banks which are protected from the sun. In travelling over the ground I could see places where the natives had put up a ridge of stone and . . . waited for the Deer [Caribou] to approach near enough to be shot.

"Two days later we met the natives about ten miles below here.

⁷To one, who is acquainted with Southampton Island and with Eskimo life in general, this drawing will seem little sort of ridiculous, though it is indeed nicely executed. The serene facial expression of the Eskimo man (or woman) who sits on the sealskin raft, legs dangling in the water, hands daintily clasping both a paddle handle and an arrow, suggests that of a vacationist at some tranquil summer resort out for mild exercise or a bit of tanning in the sun.

⁸The word *igloo*, precisely speaking, is the snow-house of the Eskimo. Captain Comer has used the word in a broad sense.

⁹These were hardly *lockers*. Here too the word is used in a broad sense.

"The men wore their hair done up in a top-knot.¹⁰ The houses were partly built of stone and earth, covered with skin (seal).

"We got some more whale-bone of them; also one sled made of whale-bone.¹¹ They also use another [kind of] sled [which is] made by using two walrus tusks for runners. . . It would look as if it could be used only by one person.

"The whale-bone we got from them was taken from a whale they had caught in 1893. The whale must have been a very good sized one as the bone was 9 feet 2 inches. I speak of this to show what they can do with the gear they make. We gave them a harpoon and a lance, also each man a knife and the women needles. We had a number of Iwili¹² natives with us. They could talk together quite readily.

"These natives were much pleased to see us. When I first went to see them our natives would not go without their rifles; while they were gone to get them I went on alone. They [the Saglernmiut] came up in force—men, women, and children, shouting 'whar, whee, whar, whee,' and showed their good will by a series of short jumps. They gathered round me, felt of my clothes, and talked like so many monkeys. Soon our people came up and then more talk. Then we went up to the houses, our natives keeping their rifles with them, two men, one on each side of me holding a hand, and the others paired off, and away we walked. We stayed and traded with them for the [whale-] bone and tried to find out about the whales. . . They would not eat the bread we offered them or the coffee. . . Our natives stood watch all night for fear they might return and attack us. I have no doubt but that the Southampton natives kept watch for fear we might destroy them.

"There was only one man who might be called old, though he might not have been over fifty years of age. To him they gave what we gave them; then he gave it back to them. . .

"We left them next day and our natives were glad to get away from them.

"In the summer of 1898 we went to Southampton . . . and landed about 25 miles below Manico Point, where we found another party of natives. . .

"We had for our object in landing to enquire of them about whales . . . and also to give them some hickory bows and arrows, knives, needles, and saws. They seemed anxious to give us what they could. . . We had an Iwili native and his squaw with us. As we had gone to the tents the woman had walked behind and was not seen at first, but when one of the older women did see her she stepped to her quickly and though what she said could not be understood she certainly acted very womanly and seemed to try to make her call pleasant.

"Whatever we gave them they would all give a 'whar whee.' When the bows were bent to show them what these would stand without breaking—that to them was wonderful. Files, of course, they did not know, but when shown the use of them there was more *whar-whee-ing*."

There follows an account of the killing of three whales, two of which drifted ashore after the baleen had been removed. The narrative continues:

"Two of the carcasses drifted ashore and made a great feast for them, besides laying up a large amount for future use.

¹⁰The Eskimo men of the Island today usually wear their hair short.

¹¹The sled was probably fashioned of the ribs of whales, rather than of the baleen or *whale-bone*. Captain Comer probably here, means, 'whale bones' rather than 'whale-bone.'

¹²Throughout Captain Comer's paper this word is spelled *Iwili*. Personally I prefer *Aivilik*. The word comes from the Eskimo for walrus, *Aivilik*. The Aiviliks or Aivilikmiut, are the people 'who hunt walrus.' Since the Eskimos have not evolved any alphabet, so far as I know, the correct spelling of their words is almost purely a matter of conjecture.

"It is a custom with the Iwilies, and I think it must be with the Southampton natives [also], that when they get a whale it is looked upon as a great gift . . . and to show their appreciation of the gift they must not be afraid of soiling their clothes but rather see how much grease and filth they can cover themselves with. . .

"The land down this way was lower than at Manico Point but rose inland, apparently. [The surface of the ground was] nothing but broken stone, but perhaps [it was] a little improvement to the land around Manico Point.

"Only one of the natives had two wives. There were only five or six men.

"I think [there were] only 14 natives in all, from what we could understand. . . The party to the north had moved to the east shore. Our natives could talk with them quite well; the women understood quicker than the men.

"During July, 1899, while [we were] on Southampton Island, [we saw] but one *tupek* or family¹³ where we were, at Lat. 63° 10' [along the] west shore. [We] were there three weeks and got a little acquainted with the man and got him to tell us how many there were on the Island by laying down as many stones as there were natives—18 men, 20 women, 8 boys, and 11 girls."

In a later section of Captain Comer's diary is a further discussion of the Saglernmiut as he found them in 1899:

"Along the shores¹⁴ are many stone cairns for storing meat and blubber . . . and here the natives have their houses. They are built round and those we went into had a large center stone raised about two feet from the floor. This stone was 6 or 7 feet across and acted as a shelf and table. Sometimes on the center of this were placed whale jaws and crown bones, then the whole covered with earth, a place being left for a window on the entrance way which was also made of stone and covered with earth. This window-hole [was] used to pass things in and out. . . The houses were abandoned in summer . . . being quite wet. From the center stone in back were raised platforms for the beds, and around and even under them were caches for stowing away meat and clothing.

"Much old blubber lay around as though they had had plenty to eat. Farther down the coast (Lat. 63° 10') we came to a tent with one family . . . consisting of the man, his two wives, two children, and two boys [who were] living with him. . .

"His tent was made of seal skin. [It was] pointed at the top, which left quite a hole over which was spread some lean meat to keep out the wind, and, I thought, to dry and smoke the meat at the same time for future use. Many pieces of meat he placed on stones which had been built up to contain meat.

"We stayed here a couple of weeks and caught a number of whales, and this gave [the family] a chance to lay up a large supply of blubber for winter use.

"Wherever we landed . . . we were sure to find the bones of whales, and not far from where we found the natives I counted forty scalp bones within a small space. They certainly [must] have been great whalers.

"This family's clothing, both men and women, consisted mostly of bearskin patched with buckskin. . . One of the wives was quite an antikook¹⁵ and she seemed to surprise our natives by her powers, telling them things they had done.

"One morning before starting off I cut some deer meat up with a hatchet and gave each

¹³The word *tupek* means 'skin-tent'; as here used it appears to be synonymous with the English word *family*.

¹⁴They were now along the shores of the Bay of God's Mercy, not far from Cape Kendall.

¹⁵The usual spelling accorded this word is, I believe, *angekok*. The word means *soothsayer*, *wizard* perhaps, or *prophet*.

boat enough for the day. We got fast to a whale, and had about killed it when we lost it by taking two boats' lines under the ice. That night when we returned . . . the antikook . . . said the whale did not like it because I had broken the deer's bones and for that reason had pulled with all its strength to get away. But her Tornwark (good spirit)¹⁶ would hold the whale for us. Two days later we found the whale . . . not far from where we had killed it, the line being fast around a stone on the bottom. . .

" . . . the other natives were off salmoning. [One of the natives sang a song] and it was certainly more musical than any I have heard among these natives."

The above quotations from Captain Comer's diary give us an excellent picture of some phases of the lives of the Saglernmiut just four years before they became extinct.

The life of the Saglernmiut, their implements for hunting, their houses, and their culture have been thoroughly discussed by Therkel Mathiassen (1927c, pp. 268-287). This account is well worth careful study, but I cannot quote at length here. Authorities agree that the Saglernmiut were an ocean-hunting people. They lived upon seals, walrus, and fish, and did not hesitate to capture the largest whales, the blubber and meat of which they used for food, and the bones were used in the construction of their permanent houses. In these winter houses "two to four families lived together as a rule." Igloos were built, according to Aivilikmiut men who were acquainted with their customs, but these were built only on journeys. Their clothing was much like that of the Polar Eskimos. Their *kayak*¹⁷ was like the sea *kayak* of the Aivilikmiut. They had no woman's boat.¹⁸ As heretofore noted, these people died out as a result of an infectious disease, not of starvation. I, myself, as noted elsewhere in the present paper, have seen the ruins of their houses at Native Point, have found their skulls and bones lying about on the moss, and have peered into the stone graves at the remains of these unfortunate people.

Because in the present volume we largely deal with the bird-life of Southampton, Mathiassen's comments upon the use of birds by the Saglernmiut are worthy of quotation in their entirety (1927c, p. 278-279):

"*Birds* were of much greater value to the Saglernmiut than to the Igloodik Eskimos. The island is fairly well stocked with birds. For large nesting birds like the swan they used bird harpoons, 1¼ in. long arrows with two feathers and loose heads, tied to the shaft by a cord; the movement of the bird broke off the head and the shaft hampered its flight. Bolas were especially used against flocks of eider ducks, mostly three or four bone balls connected by cords 1½ meters long. Bird darts were also used, with one point and three side prongs of equal height; throwing boards were used with these, with a handle and a hole in the fore-end for the peg of the dart. Geese were driven into round fenced enclosures,¹⁹ 2 meters high, 4 meters in diameter; diverging rows of stones led from the doorway; a flock of geese was driven into this . . . the door was closed, and every time a goose puts its head out through the stones its neck was twisted. The usual hooks were used for catching gulls, the hooks being of wood with a barb, and the whole buried in a piece of blubber and thrown out on the beach, whilst the cord was made fast to the ground, sometimes with a stick of wood or bone without a barb. Baleen snares were largely used for trapping birds; some of these were long cords with a number of running nooses, which were stretched about the breeding places or sunk in the water for diving birds, whilst others were single snares which were set over the

¹⁶Sometimes spelled *tornyak* or *torngak*. From what I have heard of the word, it means *evil spirit* quite as often as it does *good spirit*.

¹⁷Boat-canoe.

¹⁸*Oomiak*, so called.

¹⁹To my great surprise I did not find the Aivilikmiut or Okomiut capturing flightless geese in any such way.

nests, the latter especially for eider ducks. A little blubber was often fastened to the nooses of the under-water snares. In spring they sometimes built a low, thin-roofed snow house, just large enough to permit a man to crawl inside, close the door and sit upright; a bait was laid on top of the house, and, when a bird came to take it, the man inside could see it through the thin roof and quickly pushed his hand through and seized it by the legs."

According to Captain Comer the Saglernmiut had comparatively little to do with birds, though to be sure they did kill and eat them, and they sometimes gathered eggs. But their principal interest was in the great marine animals; chiefly the walrus and the whale. Their presence probably did not in any measurable degree affect the abundance of Southampton's bird population.

Mathiassen mentions, in addition to the Saglernmiut, another tribe, which is said to have inhabited Bell Peninsula, the southeastern part of Southampton Island. These people he calls the Sikosuilarmiut (1927c, p. 287) but he tells us very little about them.

PRESENT DAY ESKIMOS

The original inhabitants of Southampton, the Saglernmiut, are gone. Today two tribes inhabit the Island. According to Mr. Ford's careful census, made in July, 1930, there were at that time, 138 Eskimos, men, women, and children counted, on the Island. The two tribes are known as the Aivilikmiut (Aivilik people, or Walrus Hunting People), and the Okomiut (perhaps People from a Warm Place, *oko* sometimes, at least, meaning *warm*).

THE AIVILIKMIUT

The Aivilikmiut, Aivilingmiut (Mathiassen, 1928, p. 15, etc.), or Iwilic (Comer, 1910, p. 90) are, according to Mathiassen, one of the tribes of the Iglulik (or *Igloodik*) branch of the Central Eskimos.

Probably about half of the Eskimos who live upon Southampton today, belong to the Aivilikmiut. Their ancestral home is to the north and west of the Island, principally in the Repulse Bay country. They came in contact with the Saglernmiut in former years and have for a long time known of Southampton, but their continuous occupation of the Island dates back to about the time of the extermination of the Saglernmiut. The Aivilikmiut came into contact with the early whalers. They accompanied Captain Comer, Captain Munn, and Therkel Mathiassen, when these men worked about Southampton. They have come to know the program of the Hudson's Bay Company and now spend much of their time in taking fur, with which they trade at the Post.

While the Aivilikmiut are in many ways quite dissimilar to the other tribe at present inhabiting Southampton, they are not particularly different, in so far as they influence and are influenced by the bird-life of the Island. They are a pleasant, comparatively cleanly people, who now live in skin or canvas *tupeks* (tents) in summer, and in *igloos*, when hunting during the winter. The customs of the people will be discussed briefly in connection with those of the other tribe.

THE OKOMIUT

The Okomiut, or Oqomiut (Mathiassen, 1927c, p. 287) are not one of the tribes of the Iglulik Eskimo group. They live in Baffin Island to the east of Southampton. The individuals of the race now present on the Island came originally from the vicinity of Lake Harbor and Cape Dorset, I have heard. They were transported from Baffin Island to

Coats Island, where they lived during Mr. Ford's residence there. They seemed to me a good deal like the Aivilikmiut in general appearance; though they were less cleanly, were more shiftless and irresponsible, and perhaps, less intelligent. The general customs of the two tribes and their racial problems appeared to me to be about the same. Their language was different, however, so much so that at times the two tribes could scarcely understand each other. Their names for the birds, for instance, were often superficially or basically different, so that it was not easy to tell the natives what birds I wanted without knowing both tribal names for the species.

As a rule I seemed instinctively to like the Aivilik people somewhat more than I did the "Baffinlanders." But this liking may have been traceable to my own prejudices or merely to the more attractive external appearance and joviality of the Aiviliks. The two tribes, in so far as their *food* problems were concerned, were so similar that it is easy to discuss them together.

The Eskimo's principal problem is food. He must secure food for himself and his dogs, or he perishes. Southampton's Eskimos of today hunt the caribou, though this fine mammal is comparatively rare, the walrus, several species of seal, the White Whale (*Kellihughak*), and the Polar Bear for food for themselves and the dogs, and for skins, which are used in the making of their clothing. They do not hunt the large whales as extensively as did the Saglermiut. Today they do not need the great ribs for roofing their houses, and they are content with walrus-blubber for winter use. They do, nevertheless, pursue the whale, because of the trade value of the baleen, and they may use the huge carcasses for dog-food.

They live in tents in summer and sometimes in winter. While hunting or travelling they make *igloos*, but these are never used as permanent winter-homes. They have been in contact with civilization so long that nearly all the men have good rifles, and they use sewing machines, binoculars, granite-ware cooking utensils, Coleman Gasoline and Primus Kerosene stoves, imported snow-knives, steel-traps of course, grammaphones, accordions, mouth-organs, knitted sweaters, woolen underwear, lumber shirts, shell-rimmed snow-glasses, cameras, and all sorts of civilized foods. Their appearance, especially in summer, has changed amazingly as a result of this contact with the White Man's civilization. The men who are better-off may even own motor-boats. Their *kayaks* or *oomiaks* are imported canoes; their *komatiks*, or dog-sledges, are made of wood, heavy planks from the South, not of driftwood. Upon the whole they are in many ways a comparatively civilized people, and their vocabulary is likely to include such words as "Motah Khah" (motor car), "Ayo-plen" (airplane), and so on!

The introduction of modern firearms has led, I fear, to the useless destruction of some forms of wild-life. Many seals and probably walrus are killed, which can never be retrieved, since the carcasses sink so rapidly. Feeling the need of excitement, the Eskimo will shoot at, and kill, if possible, nearly any sort of living thing, rather than return from a hunt with nothing at all.

The Eskimo, however, is scarcely to be blamed for anything he does. His winter is so bitterly cold, his sources of amusement sometimes so very few, that it is not to be wondered at that he occasionally shoots an animal or bird for excitement. Furthermore he desires to keep his technique good.

All in all the Eskimos are a happy, likeable people. They take a child-like delight in playing games and in telling stories. The summer, when food is abundant, is a riotous time for egg-hunting, fishing, and playing. The ancient custom of killing daughters, when there are too many children, has disappeared. Monogamy is the rule. The influence of mis-

sionaries has, perhaps, had much to do with the refinement of certain phases of Eskimo life; but most certainly the Hudson's Bay Company, in providing a source of supplies for trade, has also helped to solve the Eskimo's racial problems, so that the Southampton Islanders of today are in no actual danger of starvation, so long as the storehouse at the Post does not burn, and Mr. Ford and the good missionaries are ready to help any or all of them at any time with ammunition, food, medicine, or clothing, as they need it.

The natives in return bring in a good annual catch of fox-skins to the Post, and attend the services at the Mission in a somewhat sporadic manner, as opportunity offers. They are friendly, though I have sometimes felt that their friendliness was not without ulterior motives. Their principal problem, as I see it, is that of dog-food for winter. The Post can supply them with flour, tea, and so on, when they catch foxes, or even with credit, when they do not. But the Post *cannot* furnish them with walrus and seals, which the dogs must have in winter. And the procuring of these marine animals is sometimes exceedingly difficult in certain seasons.

The Arctic world contains comparatively so few objects, and the Eskimo has so much spare time, when shut-in during the winter, which he may devote to conversation or contemplation, that he has developed a considerable vocabulary, and often with surprising intimacy knows the life-history of the birds and mammals, with which he is acquainted, and is upon the whole rather a good naturalist. Nearly all the Eskimos, with whom I came into contact, knew the names of birds and their distinguishing characters very well. Santiana, a fourteen-year old boy, knew the differences, for instance, between the Red-backed Sandpiper and the Semipalmated Sandpiper, and instantly gave me the correct native name for the two species without hesitation. In their discussions of certain birds, fancy was often generously mingled with fact; but the Eskimos usually knew the facts. They are keen observers, for they *have to be*. Often their lives depend upon a definite knowledge of the ways of the animals upon which they prey.

The Eskimo as an enemy of bird-life will be discussed in a later part of this volume. For the present I wish to make it clear that the natives are sufficiently interested in the birds to have given to virtually all of them well defined names. They do not always distinguish the different species of redpolls, to be sure, nor have they actually noted some of the species which I collected, which are rare (such as Baird's Sandpiper); but they are quick to notice differences in such species from those with which they are familiar. They are not, however, always acquainted with the nest and eggs of well known birds; Amaulik Audlanat surprised me, for instance, by confessing that he had never seen the eggs of the Black-bellied Plover (*Torgaiuk*) and he was amazed when I showed him how large these eggs were in comparison with the size of the body of the female.

In the List of Species, Part II, Section 2, of this work, I have attempted, wherever possible, to give and to explain the Aivilikmiut names for the birds of Southampton.

Since birds are so prominent an element in the world in which the Eskimo moves, it is not surprising that his stories and legends include many references to *Kopernoak*, the Snow Bunting; *Ookpikjuak*, the Snowy Owl; *Tooloogak*, the Northern Raven; and so on. The Eskimos all know that their familiar summer birds go south in winter, though it is questionable that they ever gain a proper conception of the trees, great rivers, and so on, of the more southerly latitudes, in which these birds may live while they are not in the Arctic.

The names, which the Aivilikmiut have given the birds, are in most cases onomatopoeitic, some of them very cleverly so; others suggest the kind of locality in which the species is to be found, others mannerisms, color, and so forth. In the ornithological section, wherever

I have written down an Aivilikmiut word, I have intentionally not followed the spelling of any author, not even Peck himself, for to my way of thinking, it is impossible for us to *know* how these words are to be spelled, and the best we can do is to spell them with our own letters in such a manner as to give the best possible representation of the sound of the word.²⁰

THE CONCEPTION OF SOUTHAMPTON ISLAND HELD BY THE ESKIMOS

When I showed a map of Southampton to the Eskimos they hastened to explain to me that my map was misleading in many ways. They agreed that the general shape was about right, but that the "Bell Peninsula," Seahorse Point, and the East Bay regions were badly in need of revision.

Mr. Ford and I finally consulted with the men as to a means of getting a good drawing of the Island's coast-line as it should be. It was finally decided that Tommy Bruce²¹ should



Fig. 1. First sketch of outline of Southampton Island drawn in pencil by Tommy Bruce, an Aivilik Eskimo.

make the map, since he had travelled widely and was known to be clever with the pencil. Amaulik Audlanat, who is the only man, so far as I know, actually to have entirely circumnavigated the Island, worked with Tommy; and the combined efforts of these two men

²⁰For example, the Eskimos refer to a certain place not far southwest of the Post as *Munnimunnek*, with both "u"s short. Etymologically this word is said to mean *Moss-Moss*, and should according to Peck, be written *Mannek-Mannek*. What, I ask, is the point in spelling such a word in a manner in which it is not pronounced, or in assuming that our letter *a* be pronounced in Eskimo as a short "u"?

²¹Through an unfortunate lapse, the native name of this fine Eskimo was not recorded in my diary. Even among the natives he was usually called *Tommy Luce* or *Tommy Bluce*, or *Tommy Lewis*. (Plate II, fig. 2)

resulted in the outline chart which is reproduced here.²² Tommy first drew a rather small sketch, which, when examined and commented upon by all, was considered inadequate. [Fig. 1]. The second draft [Fig. 2] represents about one full day's labor.

Certain digressions from modern charts are at once apparent in these sketch-maps, though the general shape is the same. The size of the sheet of paper, upon which Tommy Bruce worked, may have affected the shape of his drawing to some extent, since he probably felt an instinctive desire to fill to the best of his ability the allotted space without waste. All in all, the most striking deviation from Comer's map (1910, p. 85) is the general treatment of the region of Bell Peninsula. Here the whole geography is so changed that one can scarcely recognize Seahorse Point; East Bay seems rather to be two equi-sized bodies of water; and there is a bay north of Seahorse, which seems to be quite without its counterpart.

Since the region of South Bay has been well charted (as shown in Comer's and other charts), and since Tommy Bruce's delineation of this section does not by any means agree



Fig. 2. Second sketch of Southampton Island drawn by Tommy Bruce, some localities designated by the author.

²²Mathiasen (1931, p. 11) also gives us an Eskimo's drawing of Southampton. The man who made this map Mathiasen calls *Auddlanāq*. There is a strong chance that this very Auddlanāq is the Amaulik Auddlanat of the present paper, as noted elsewhere. He is shown on Pl. II, figs. 2 and 4.

with facts as we know them, we have every reason for suspecting that his treatment of Bell Peninsula may be wrong in some particulars; that the size of certain bays and islands may be exaggerated according to recollections the natives cherish of experiences on these bays and islands; and that the general bearings of the coast-lines may be wrong in view of the scarcity of compasses among the Eskimo hunters. Nevertheless, and in spite of all possible errors, these maps are worthy of study. The detail of the islands at Seahorse Point is surprisingly good, as I can state from personal observation. The general trend of the coast-line from Native Point to Seahorse seems to me actually much more accurate than in any chart I have seen, and the placing of Leyson Point much more in accordance with facts as we found them, than is indicated, for instance, in Comer's map.

Tommy Bruce's map even suggests that there may be a good deal of misunderstanding as to the actual position of Seahorse Point. Since he shows on his map a considerable body of land to the north, the easternmost extremity of which is far eastward of his own Seahorse Point, it occurs to me that the Eskimos may for years have entertained an absolutely incorrect idea as to the location of Seahorse, and that Tommy Bruce's Seahorse may actually be Leyson Point, the point discovered and named by Lyon in 1824.

I had no means of orienting myself accurately, when I stood on the island marked as Seahorse Point on Tommy Bruce's map. I thought I was at Seahorse because the natives told me so. The discussions of Leyson Point in the literature I have consulted do not mention any islands in the adjoining waters. A further careful study may, however, disclose many misconceptions concerning this entire region. Since I could not make any authentic surveys myself, all I can offer is my own field-map of what I thought to be Seahorse Point, but which may possibly be Leyson Point, at the same time expressing the hope that more careful geographical study may be made, which will clear up the whole matter for all time.

My principal reason for believing that the region we visited was actually Seahorse is that the islands shown on Baffin's map of 1615 seem so adequately to represent those we saw; furthermore, we must account for Captain George Back's James Alexander Gordon Bay, which was named in 1836, but which seems not to be indicated on any of the modern charts at hand.

Tommy Bruce's figure of Tooktootok Island is hardly adequate. He shows the island as too large and too far from the shore. He has shown in East Bay an island, which personally I did not observe. His rendition of Gore Point, however, is good; and his general treatment of the shore-line from Cape Low to the head of South Bay is not far from correct.

It must be remembered that some of the Eskimos are familiar with published maps of their home land; and in their sketches they probably to some extent follow their recollections of published maps. In the present case, I saw to it that Tommy Bruce was not permitted to copy his drawing from anything. We then compared his drawing with a published map and certain modifications were thought desirable.

While I realize that there are many errors in Tommy's drawing of Bell Peninsula, I am convinced that a survey of this region will result in a chart amazingly different from that to which we are now used, but which I unfortunately feel obliged to follow in presenting my own map of the Island.

EXPLANATION OF MAP

(PLATE I)

The map of Southampton here reproduced purposely follows Mathiassen's (1931, inserted) because my own geographical work was not extensive or accurate enough to warrant

making any radical changes. Mathiasen's map incorporates many modifications upon Comer's well-known chart (1910, p. 85), which have been suggested by Comer himself (1913, p. 517), by Munn (1919, p. 53), and others. I am convinced that some further, and radical changes will have to be made in a proper delineation of East Bay, of Seahorse Point, and in recognition of Back's "Gordon Bay."

PLACE-NAMES FIRST GIVEN IN THE PRESENT MAP

Most of the following rivers, islands, and so forth are, so far as I know, first given definite names in the present chart. Some of these names have been in use among the Eskimos for years. Others have been used by Mr. Ford and his son, ever since they have lived on the Island. A few I have ventured to suggest myself. It seems to me that, wherever possible, native names or their English equivalents, should be used; and this general rule has been followed by me. The following list is chronological in that it gives the place-names in the order of my personal visit to, or exploration of, the localities in question.

Prairie Point: This place is called *Qidthuag* on Mathiasen's map. Throughout the present paper the region is referred to as *Prairie Point* in recognition of its flat, prairie-like character.

Ranger River, or *Kashigiaksoak*: A medium-sized stream, which empties into Fisher Strait not far east of Cape Low. It drains a considerable area, for, after passing through a rather large shallow lake, into the upper end of which several smaller streams empty, it issues as a single river, which runs eastward for a way, then abruptly turns south. The river is named for the Ranger Seals, which are found in abundance at its mouth. The stream is indicated in Mathiasen's chart as a dotted line.

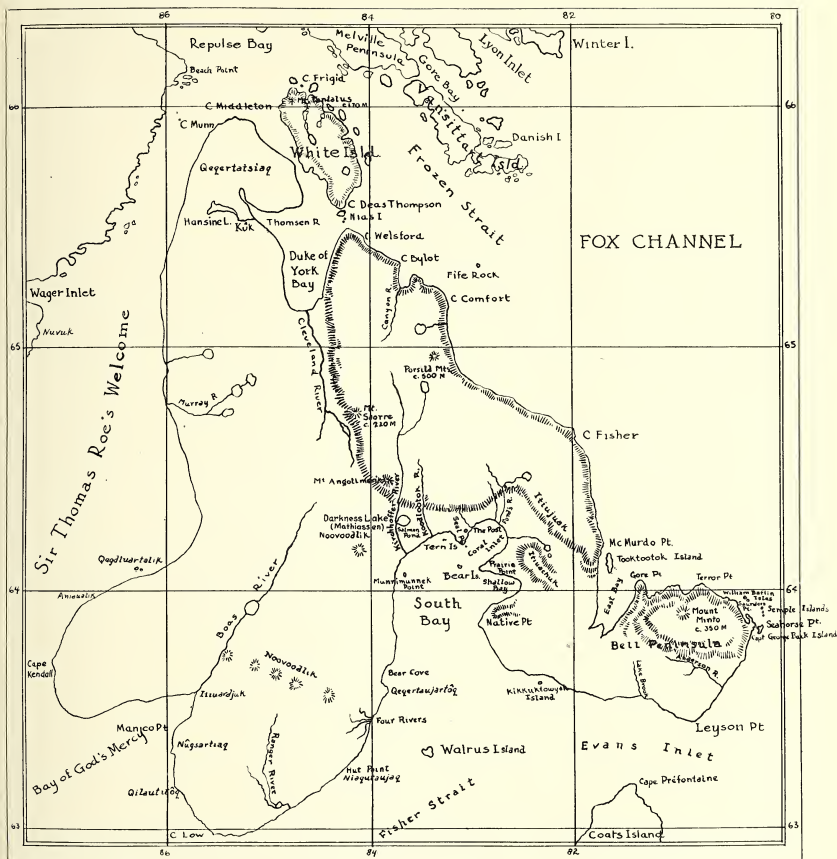
Kikkuktowyak Island: A small, flat island, not far off shore, southeastward of Native Point. Here walrus were seen in considerable numbers. The island is not shown in Mathiasen's map.

Lake Brook: A small stream west of Leyson Point, which I called Lake Brook in my own field-notes, but which Mr. Ford called Mosquito Brook after the innumerable inhabitants of the place.

Anderson River: A fair-sized stream, which I have indicated as about midway between Leyson Point and Seahorse, which Mr. Ford called Whale River because whales had been seen and killed in the ocean nearby. The name *Whale River* seems to me hardly proper, since whales are never seen in the stream itself. Both Mr. Ford and I would like to have the stream bear the name of Dr. R. M. Anderson, Chief of the Division of Biology in the Canadian National Museum, in view of his keen interest in the exploration and study of the North Country. The stream has cut for itself a spectacular gorge, which Jack Ford and I called *Devil's Gorge*.

Captain George Back Island: A medium-sized island just at Seahorse Point, which at first appeared to be a peninsula, but which is actually cut off by a narrow shallow channel. The island to which I waded and across which I walked, may be two miles long and a mile or more wide. It is not as rugged as the cliffs farther north, but rises to a height of perhaps two hundred feet. Between the island and the "mainland" is a good, though small, harbor.

William Baffin Isles: Two rather high, precipitously walled islands, perhaps five or six miles north of Seahorse Point. These islands must have been seen by Baffin, since they are shown on one of his charts. They are not, however, to be found on modern charts, but like the other islands in this region should be named.



Scale 1:1,500,000

MAP OF SOUTHAMPTON ISLAND, HUDSON BAY

(Constructed by G. M. Sutton from current maps and personally made field-maps)

Semple Islands: Three small islands lying offshore from Seahorse Point to the north or northeast. The Eskimos had no name for them. If this, indeed, be the region of Seahorse Point, then Back probably saw the islands during the course of his unhappy wanderings about in the *Terror*.

Tooloogak Bay: A narrow arm of the sea, extending possibly three miles inland, not far north of Seahorse Point. *Tooloogak* is the Aivilik Eskimo name for the Northern Raven, many of which nested in the cliffs about this bay. The name "Tooloogak Bay" does not appear on my map, because of the crowding of names at that point.

Ford's Rivers: I am not certain whether the two streams, which flow southward about ten miles east of the Post, join to form one stream before emptying into Coral Inlet, or not. The impression received in winter is that they have separate mouths, and so apparently, Mathiassen with dotted lines has shown them. They rise in the high country near Itiujuak, flow southward for a way, then turn somewhat west. In spring they are raging torrents, but they calm down considerably later in the season. I have named these streams after Mr. Ford and his son, in view of the fact that they have travelled thereabouts a great deal, and given to the scientific world many interesting facts concerning the Island as a whole.

Itiuchuk: A rather high mound or plateau of gravel, without any definite cliffs at the edge, just south of and not more than ten miles from Itiujuak (*Itiudjuak* of Mathiassen).

Noovoodlik: The "peculiar, shed-like hills" of the various charts are called *Noovoodlik* by the natives. This word is not exactly a name, but is rather a descriptive word for this sort of gravelly, smooth-sloped hill. These *Noovoodlik* have been shown in former charts as too near the coast; the more westerly one according to Tommy Bruce and others really is one of a series of five such mounds lying between the shore of Fisher Strait and the head of the Bay of God's Mercy. All these hills are hills only by comparison with the very flat terrain about them.

Tooktootok Island: This, with the smaller islets about it, lies just north of East Bay, not far off the shore. It is, perhaps, six miles long and four miles wide, maybe larger. It has no cliff-like shores, but is nevertheless quite rugged and there is a considerable ridge in the middle, from which it is possible on a clear day to look across to Gore Point, to the body of water beyond that, and thence to other points of land, which stick out equally far. *Tooktootok* is the Aivilik expression for 'Place of Caribou.' Here, in mid-winter we saw numerous caribou tracks; and here, in summer, many of the caribou withdraw to rear their fawns. On most charts the island is drawn much too large.

Koodlootok River: A medium-sized stream, which empties into South Bay about ten miles west of the Post. This stream, in my opinion, has about the position of the Kirchhoffer River of Mathiassen's map. The Kirchhoffer, on the other hand, is farther to the west.

Duck Bay: A small arm of South Bay, just west of Seal Point. The Tern Islands (shown as only one island in Mathiassen's map) lie in this Bay, not named on my map.

PLACES INCORRECTLY SHOWN IN RECENT MAPS

The only points, at which I am certain Mathiassen's map is wrong, are the small islands in South Bay, all of which are much too large. Bear Island is a mere mound of gravel scarcely large enough for a roomy native encampment. The two Tern Islands should appear as mere dots; and the rather long island he shows as just south of Munnimunek (Manimaneq) is in reality only a barren sort of rocky bar a few rods long, to which the Eskimos have not even given a name. It is surprising that the little Kikkuktowyak Island (east of

Native Point) is not shown, since this is an important walrus hunting-ground, and a famous nesting-place for Eiders and Old-squaws. The really prominent Noovoodlik are not indicated at all in this map, nor is the broad plateau of Itiuchuk. All of the above places are, of course, relatively of little importance.

THE EXPEDITION TO SOUTHAMPTON ISLAND

1929-1930

The *Nascopie* reached Southampton Island early on the morning of Saturday, August 17, 1929. Through my port-hole I looked out across the gray water to a low-lying shore on one of the highest portions of which were a few neat white buildings, the Hudson's Bay Company's Trading Post. The great Island stretched out in a misty band, purplish gray to the east, where the land gradually rose to a considerable height in the distance, and yellowish brown to the west, where the horizon faded into the cloud-hung sky. The day was drab, chilly, colorless. Yet I thrilled at the very starkness of the world about me. At about noon I went ashore for the first time, and met some of the Eskimos, who were to be my friends and companions for the winter. Mr. Ford and his son Jack made me feel at home at once, and showed me where I was to live. I was instantly impressed with the neatness of the Post, and with the apparent happiness of the natives. I knew on that very first day, that I had not made a mistake in deciding to cast my lot for a year with these smiling, brown-faced people.

About the Post were many birds, which interested me immediately. Long-tailed Jaegers gracefully circled the *Nascopie*, their blackness contrasting strongly with the whiteness of the gulls and terns, which flew about everywhere. Near a pile of lumber at the Post was a half-grown White-rumped Sandpiper, here a familiar dooryard bird. Snow Buntings and Lapland Longspurs were to be seen on every hand. A raven circled overhead. Loons called in the distance. Families of horned larks ran about on the nearby ridges. Shore-birds of several varieties were to be seen or heard along the beaches.

I had been on the Island little more than half an hour, when a neatly prepared Blue Goose skin was shown to me, and I was told of a large breeding-ground of this rare bird at a place near Cape Kendall. A little later Mr. Ford showed me an egg, which he thought was that of a Bonaparte's Gull. I was so excited over the prospects of "my year," that I was impatient for the *Nascopie* to leave, so that I could get down to work.

On August 18 I spent most of the day aboard the *Nascopie*, though I had opportunity to take a short walk back of the Post. I perceived that summer was almost over. A few flowers were blooming; but no butterflies flew about; and I saw but one bumblebee, a few small flies, and one spider. Many birds were in evidence and I foresaw that I would be able to do much good ornithological work in the vicinity of the Post. The *Nascopie* left at about six o'clock in the evening. There was much shouting of farewells and roaring of rockets. As the great steamer pulled out I had a moment of peculiar exultation: peculiar, because I felt I had no right to experience such happiness at the thought of being cut off from the world at home!

THE POST

The nine buildings at the Post were grouped on a smooth-topped ridge, not far from the water's edge. All but one of the buildings were white, and all but the Roman Catholic Mission to the rear were comparatively low-roofed. All of the Company buildings faced

southeast across the harbor. The principal structure, with its broad, familiar sign, was the Company Store. Here all of the trading went on, and here many valuable goods, clothing, food-stuffs, matches, and so on, were kept. To the east of this building stood the Chief Trader's dwelling, where Mr. Ford, Jack, and I lived, not at all a large house, but very comfortable, the second story being rather low. Farther to the east was the still smaller servants' dwelling, where lived the Eskimos, who discharged the various routine labors at the Post. To the west of the Store was a building where canned goods were kept, much of them still packed in strong wooden boxes. West of this building was another storehouse where traps, hardware of all sorts, lumber, oil, and so forth were stored. Considerably to the west of this building was the small powder-magazine, painted red, where ammunition was kept. Between this magazine and the stores, but standing almost at the water's edge, was the "oilhouse:" where all sorts of salted skins, walrus, white whale, and various kinds of seals were kept; where tons of foul-smelling dog-food waited the winter season; where seal-oil was stored in barrels; and where long strands of baleen were bundled up ready for shipment to "the Outside."

Back of the Company buildings were the two Missions, the rather large and neatly-steepled Roman Catholic Mission, a white, red-roofed, two storied structure; and the smaller, and at that time steeple-less Anglican Mission, where the native missionary, Keetlapik, lived.

Between the Company buildings and the beach, as well as on the higher land back of the Post, were numerous scattered canvas and sealskin tents, or *tupeks*, where lived the Eskimos, who had come to assist in unloading the supplies from the *Nascopie*, and in taking aboard the precious cargo. All of these tupeks disappeared in a day or two, for it is strictly against the regulations of the Company to encourage the natives to linger longer than necessary anywhere about the Post.

On the evening of that first day at the Post, Sam Ford, Jack, and I had a good time with the Eskimos, who shouted and danced about in great glee. Mr. Ford explained to all of them why I had come; and, as well as he could, what I wanted. They were all very cordial and shook hands with me in a friendly way. Then we three white men got several boxes of candy from the store and threw handfuls of the sweets into the air for a free-for-all scramble. What hilarity!

The natives grunted a little as they carried my great trunks up to a safe place alongside one of the Company buildings. I daresay they wondered what could be in those heavy boxes. I fancied their faces fell a little as they saw me unpacking my matter-of-fact equipment. But they did not complain. I hastened to take what special tools I should need at once over to the Factor's house, where I was to have my workroom and sleeping quarters. On the morrow, I foresaw, I should begin my survey of the Island in earnest.

COUNTRY ABOUT THE POST

The region about the Post was not flat. The Post itself was built upon one of a large series of low, rocky ridges, which run for the most part in a northeasterly-southwesterly direction, and which become gradually higher farther inland. Between these ridges were pleasant grassy or willow-studded flats or prairies, where even at this late season a few flowers were still blooming. Most of these ridges were not especially rugged. Some, however, were crowned with heaps of boulders, or with a serried outcropping of rock. Most of the rock in this section appeared to be granitic. At Seal Point, to the west of the Post, the land rose

abruptly from the water to a height of about one hundred feet. The low cliffs in this section, while not high, were precipitous and rough.

All about the Post, especially in the region to the eastward of Seal Point, were hundreds of lakes, varying in size from shallow puddles across which a stone could be tossed, to great bodies of water a mile or more in length and of considerable depth.

About twenty miles to the northeast of the Post rose up the bold headland of Itiujuak, gray in the distance; south of this, across a wide prairie, was the more smoothly ascending Itiuachuk, the low ridges of which declined westwardly toward Prairie Point. North of the Post, its crest scarcely noticeable because of the gradual change in color between foreground and background, was Poorhouse Hill.

From the windows of the Post we could look across South Bay to Prairie Point, seven miles to the southeast. Toward the southwest, in the direction of Bear Island, the waters of the broad Bay extended, reflecting endlessly the varying moods of wind and sky.

From August 18 to 27 I made daily trips about the Post, familiarizing myself with the shore-line, learning of the places where I could wade across the brooks without becoming too wet, and finding, to my great surprise, that distances in this land of clear atmosphere were often deceptive. I walked once to the head of the Bay; again almost to Poorhouse Hill; many times to Seal Point, not far away; and inland to the north for a distance of about ten miles.

FIRST TRIP TO PRAIRIE POINT

On August 25 Mr. Ford, his son Jack, Scotch Tom (a native) and I went by motor-boat to the low land across the Inlet, where many kinds of birds were said to nest. The day was wonderfully fine and we made the seven-mile journey in a short time. The country in which we found ourselves was so flat, and inland so grassy, that I could not resist calling it Prairie Point at once; and this name seems to have appealed to all who heard it. Along the smoothly curving shore-line were beaches of rough, angular chunks of limestone, which were very difficult and tiresome to walk upon. Just inland from these beaches were narrow lakes and pools, which seemed to fill in the depressions paralleling the shore-line. On the inner shores of these lakes and ponds a good deal of grass grew, and vegetation increased farther inland. The whole region was dotted and splotted with lakes, most of the inner ones quite large, but all comparatively shallow. About these lakes, through which Jack and I waded, swarmed thousands of Arctic Terns and Red Phalaropes, and great flocks of shore-birds fed along the outer beaches. After walking inland a good way into country, where the grass was so thick that we rarely even saw a rock, we found a small colony of Sabine's Gulls circling about with some Arctic Terns. We saw some Brant and a family group of other geese, but did not find any Snow Geese in the place where Jack had seen them during the spring.

To the eastward of Prairie Point the land rose gradually, in a series of smooth gravel ridges, to a great, barren plateau the highest part of which was called by the natives *Itiuachuk*. I later was to learn more about this plateau.

To the westward in the Bay we could see the uninteresting mound of gravel, known as Bear (or Bare) Island, where many sea-birds once had nested, but which was now a native encampment practically devoid of wild life. I did not actually visit Bear Island until the following winter and spring.

Though the day was warm, we encountered but few mosquitoes, and found no flowers blooming. Most of the shore-birds were obviously in migration. The young Sabine's Gulls were flying about with their parents and probably the only reason the young terns were not

all on the wing was that the egg-hunting proclivities of the Eskimos had forced the birds to lay second, and perhaps even third and much delayed sets.

THE TRIP TO CAPE LOW

On August 27, Mr. Ford, Amaulik Audlanat, and I set out by motor-boat for Cape Low. We were prepared for a three weeks' journey, though I did not see how we could care properly for any large collection of specimens in the small amount of space which the small craft afforded. On the first day we travelled about fifty miles. Part of the time we had difficulty making headway against a strong wind.

Soon after leaving the Post one of the "peculiar shed-like hills," which are indicated on some charts, came into view. It appeared to be a smooth-topped dome rising considerably higher than the surrounding flat country, perhaps to a height of two or three hundred feet. Mr. Ford told me that this "hill" was composed of gravel. It had the appearance to me of some sort of terminal or lateral moraine. As we went westward, we passed a small flat island, which I understood had no name, even among the Eskimos. This island was considerably to the west of the little Tern Islands west of Seal Point, and was just north of Munnimunnek Point, where on the flat promontory a native encampment could be seen at a distance.

Beyond Munnimunnek we passed some strange, bluff-like cliffs, which probably were of limestone, and which appeared to me to rise sheer from the water's edge to a height of about fifty feet. Along the bases of these yellow-brown cliffs the yawning mouths of several large caverns seemed to open. Some of the natives, I learned, had examined these caverns to some extent, but they had not given them a name.

Farther westward we made our way across the mouth of a cove, at the head of which a great ice-bank seemed to extend for several hundred yards along the shore. I had no opportunity to personally examine this interesting ice-bank, but my companions, both of whom had seen it close at hand, said that it was about nine hundred yards wide; that it never melted; and that it extended for a considerable distance inland. The country hereabouts was very flat, and there were no hills back from the shore, so this ice-bank could hardly be called a glacier, although it strongly suggested some such formation.

We saw many Ringed Seals, or *Netcheks*, as we went along, but noted few birds. We finally put to shore along a beautiful sandy beach, where Amaulik said it would be safe to spend the night. We propped the boat up as the tide went out, and prepared to leave early in the morning as soon as the tide should be full.

I found the country here very wild. In the sand were numerous tracks of Barren Ground Caribou and the trail of an Arctic Fox. In the far distance, its crest partly veiled in mists, rose a great mound or hill which seemed to loom higher as night descended. This, I was told, was another of the "peculiar, shed-like hills," which are called *Noovoodlik* by the Eskimos. The soil hereabouts was very sandy near the shore; farther inland it was more muddy, though the grasslands were broken up by low, gravel embankments where it was pleasant to walk after laboring along through the marshy prairies. These embankments were honeycombed with the burrows of lemmings. At nightfall I had the pleasure of seeing in the distance my first Little Brown Cranes; great, dignified birds, which trumpeted across the tundra, as they majestically flew away. The sound of their bugling sent shivers up and down my back.

I named this place *Four Rivers* on my chart, because near our boat anchorage four small streams emptied into the Bay. It was exceedingly difficult to follow the course of these streams, for they meandered a great deal through the flat country, passing along one side

of a gravel ridge for a distance of several hundred yards, then winding abruptly about the end of the ridge to follow down the opposite side in precisely the other direction. As I walked inland, I seemed to be constantly crossing rivers. They were pleasant streams, too, most of them shallow, with clean sparkling bottoms. I finally decided that, in general, three of of the four "river valleys" here eventually led inland toward the distant Noovoodlik; and one paralleled the shoreline for some distance to the west, so it probably drained a different section of the country.

The lakes at this point were all small. The grass-lands extended almost without interruption to the very base of the Noovoodlik.

Early the following morning we left Four Rivers and voyaged westward, eventually reaching a point about eighteen miles east of Cape Low. The day began propitiously; but the wind soon sprang up and we had difficulty making any headway. Navigation of this coast is not easy, because there are so few good harbors. The whole coast is very shoal, and it is necessary to keep from two to ten miles out, even in a small boat, to avoid striking rocks or becoming grounded, especially at low tide. By the middle of the afternoon, as the wind's strength increased and the seas began to be tempestuous, I found myself getting sea-sick. I tried steering the boat and was refreshed to some extent by the spray, which struck across my face about twice every minute; but finally I had to give in. The gale became so fierce that Sam and Amaulik decided it best to make for the shore. The engine did her best; but we progressed tediously. Finally we began to strike bottom. The waves lifted us into the wind, rocked us back and forth, then slapped us down with awful jolts. We didn't know what to expect. We thought we should have to put out to sea to avoid being broken to pieces. When we started the engine again we did not move forward; the propeller was done! I was so sick by this time that I couldn't think very clearly; in fact I preferred not to. But my companions were still masters of the situation and they put themselves heroically to the task of getting us into some sort of shelter. Frankly, I don't know how they did it. They got into our little tender, rowed ahead through those rough waves, and dropped our anchor nearer the shore. By hauling from the larger boat at the anchor chain, then setting the anchor anew, and so on, they slowly brought the boat to a sheltered place. It meant at least two hours of very tiring work. Fortunately the wind subsided somewhat, and, after we had come in a way, we found ourselves in the lee of a low hill. Finally we could touch bottom with our boat hook and were able to push our way in. I helped a little in this work, though I had to be careful to avoid falling into the water from sheer dizziness. This was my first experience with really violent seasickness and I felt wretchedly ashamed of my uselessness.

Finally we agreed that we were near enough to shore to drop anchor for the night. As we lit our gasoline stove for boiling some tea, Arctic Foxes barked at us from the shore nearby. As I went to sleep I felt that it was only the pluck and endurance of my companions that had kept us all from drifting out into the merciless waves of Fisher Strait, whence there might not under the circumstances have been any return.

On the following morning there was a heavy frost. We found that the propeller had not been lost and that it probably could be repaired. We brought the boat nearer to the shore, and, at the going-out of the tide, Amaulik set to work with a brass bar and a file to repair the injury. I took a walk along the beach and noted many shore-birds, including some species, which I had not before seen on the Island. The country was very flat. On the highest places along the shore were remains of old stone fox-traps, which had been built by the Eskimos. I saw a family of cranes, and chased down a half-grown Whistling Swan, which could not yet fly.

At about six o'clock in the evening we journeyed a short way westward to a little, well sheltered cove, where we planned to wait awhile before going on to Cape Low. The barometer was steadily falling, so we expected the worst in the way of weather. Owing to headwinds and rain we lingered at this anchorage until September 1. I found the country very monotonous inland, although along the shore it was somewhat rolling. I spent much of my time going up and down the beach, where I searched for interesting shore-birds. On August 31 I went some distance to the westward and found a large lake, about which a colony of Herring Gulls lived, and where along the inner shore a large number of swan-nests were to be seen. Inland from the coast there were not many lakes.

On September 1 at about ten o'clock in the morning we set out again for Cape Low. We encountered rough seas and some wind, but kept on, passing an ugly reef or two, and finally wound about among the shoals into the mouth of the Ranger or Kashigiak River, where Amaulik knew there was a good harboring place. It was a relief to get in out of the wind, and to cruise quietly along in the shelter of the gravel embankments, which lined the mouth of the stream.

I found the Ranger River to be only a medium-sized stream. At its mouth it was probably not over one hundred yards wide. Its banks were of clean gravel and they were rather steep and high. Almost immediately after we anchored, a handsome Ranger Seal stuck his head out of the water near the boat, and Amaulik straightway went off on a hunt. The weather was fairly bright and pleasant and the wind abated by evening. I was so busy skinning specimens that I had no opportunity to get out that day.

On the following morning (September 2) I walked inland, and to the westward almost to Cape Low. I followed the Ranger River to a big shallow lake, and found that to the west and north of this lake several streams made their way out from the grassy tundra. The whole country was exceedingly flat. Even in the far distance the land did not seem to rise much. The outer beach was of sand and gravel, and extended in graceful curves for miles out toward Cape Low. At the top of the beach was an unbroken line of large flat pieces of white limestone, which evidently had been tossed up by the roughest storms. Inland a short way from the salt water were numerous depressions between the gravel embankments and most of these depressions were long, narrow lakes, some of them quite deep. Birds were to be seen everywhere; great flocks of Snow and Blue Geese, companies of Whistling Swans, bands of jaegers, and hordes of shore-birds.

Just east of the Cape proper was a sort of cove, which at low tide became a vast mud-flat. Here the shore-birds swarmed and jaegers, eternally hungry, swooped about among them all day long. At high tide the beach all along this stretch of coast-line was about one hundred feet wide, and rose at a rather steep angle, making walking difficult, save along the very rim of limestone rocks.

The weather steadily promised to become worse. Since we had determined that we were too late to find any young Blue Geese, and were afraid that we could not find any good harbors between Cape Low and Cape Kendall, we decided we had better go back to the Post before the season advanced further. On September 4 at about half past four o'clock in the morning we set out on the return trip. It was cloudy, windy, chilly, and rainy. At about ten o'clock we sighted a native camp along the shore and made our way in, feeling that the wind was getting too strong for us. Upon reaching shore we found ourselves not far west of our former anchorage at Four Rivers. Noovoodlik rose up in the distance, the only landmark of any general sort in the whole region. Inland from the beaches there were but few birds. In my notes I find this passage: "At this awful 'camp' there seems to be little

bird-life. I walked a long way inland, following a brook, and going toward the strange shed-like hill, which sticks up in the distance. It is blowing hard, unpleasantly so, so that shooting is difficult. The shore-birds are very wild. Our boat is propped up among a bed of stinking kelp, which smells awfully." We remained at this place until September 9. The weather was disagreeable. It rained and blew, and we had much fog. I tramped along the shore nearly every day and made a few trips inland, where the bird-life was disappointingly scarce. One day three Polar Bears were killed by the natives. I found that some of the interior country was very marshy, unpleasantly so in fact, for I had difficulty in getting out of one muddy place, through which I had waded hoping to get closer to a pair of cranes.

I noted that along one side of the distant Noovoodlik there was a band of light color. This, the natives told me, was caused by some different sort of gravel. This hill was rather symmetrical, the sides sloping up at about the same angle, giving it decidedly the appearance of a great tabernacle, or pyramidal tent.

On the morning of September 9 at about two o'clock we started for "home." It was cold. There was a scum of ice on the salt water. During the night there had been a brilliant auroral display. But the day was calm and the ocean smooth as glass. We had little trouble in making the Post just after noon. As we made our way along the west shore of South Bay we passed the mouth of the Kirchhoffer River, which I could see was a fair-sized stream.

TRAVELS ABOUT THE POST

On September 10 we had the first snow-fall of the autumn. On the following day we had an even heavier snow, perhaps an inch deep. I was out for specimens on both days and was delighted to see the tiny leaves of the dwarf trees turning to a rich scarlet, which glowed in the sunlight.

SEAL POINT

On September 12 I made a special study of Seal Point to the west of the Post. Just off this point were several small islands, some of them flat and sandy, others angular and rocky. The outermost bars of the Point were sandy and here pretty stands of tall grass grew. On the western side of the Point the land rose abruptly to a considerable height, almost as a cliff. On the crest of this high land were many beacons, which were the remains, I was told, of Captain Munn's camp. Some of these beacons were built up of loose stones to a height of about eight feet. Lying about on the ground were numerous bones of caribou, walrus, and seals. Inland from the Point were several lakes, one of which with rather high shores was quite large. In this lake were many islands, some of them rocky, with precipitous sides.

The western side of Seal Point extended into a wide bay, which Mr. Ford usually called Duck Bay. The head of this bay was quite shallow, and the shore-line dropped down to a low sandy beach, quite different from any beach at Seal Point or to the eastward of the Post. A small stream emptied into the head of Duck Bay. In the middle of the bay were two tiny islands, both of them flat and grassy, which I later called, as had Captain Munn, the Tern Islands. I did not visit them until the following spring.

POORHOUSE HILL

On September 14 I made a special trip to the high ridge about ten miles back of the Post, which is known as Poorhouse Hill. I had gone thither in quest of Rock Ptarmigan, which up to that time I had been unable to locate. I found Poorhouse Hill to be a ridge of granitic rock two miles long, parts of which, especially toward the west, were quite rough.

Toward the east it ran into other similar ridges, which extended inland toward the distant Itiuak.

From the crest of Poorhouse Hill I could look inland a great distance. I could see that the country there was very flat, and that there were not many lakes. There seemed to be little grass in the plateau-like country inland from the Hill, the vegetation being mostly moss and lichens. In the sheltered places among the rocks I found some pretty clumps of rock ferns, and some willow-trees, which grew to a height of nearly four feet.

Along the southern face of Poorhouse Hill there was a cliff-like place, where I thought Duck Hawks might nest. I found a family of Rock Ptarmigan feeding not far from this bluff.

THE TRIP TO SEAHORSE POINT

At about eight o'clock on the morning of September 18 we left the Post on the motor-boat *Shookak*, bound for Seahorse Point. Our purpose was to locate a whale, which Amaulik had mortally wounded in July. On board were Jack Ford, Amaulik Audlanat, Kyakjuak, and I. We left in a wild, loose, snow-flurry, which died down an hour later. At noon we passed close to Bear Island and made our way across the bay north of Native Point, which the natives call Ooyalajuak (Big Stone Bay), and which in my chart is called Shallow Bay.

We reached Native Point in the middle of the afternoon. Here I was delighted at being able to see some of the remains of the encampments of the extinct Saglernmiut, the Eskimos who had inhabited Southampton prior to the coming of the Aivilikmiut and Okomiut in recent years. I did not attempt to excavate any of these ruins, since I was not properly prepared to preserve ethnological material of this sort, and did not, furthermore, have an official permit for so doing. The ruins were considerably overgrown with grass, but I could see that the structures had been well made. Through one of them a small stream was running.

To the north of Native Point was a prominent ridge, or mound of gravel, which had rather steep sides. Jack and I made our way to this hill and scaled it, finding at the top several graves of the Saglernmiut, in which were plainly to be seen the bones of both old and young persons, crudely covered with flat stones. Not far away, lying on the moss, was a human skull. (Pl. III; fig. 4).

There were a good many lakes in this section, most of them not far from the coast. At Native Point proper there was a fairly good harbor, where, even in the roughest weather, the waves never became very high. Not far from the beach were the skin and canvas *tupeks* of the present-day natives, and near these, lying on the sand, were the remains of many *Kellilughak* (White Whales or Porpoises) which had been recently killed. As Jack and I made our way back to the camp, we were overtaken by a native, who was driving his dog-team and *komatik* across the moss and gravel, and here I had my first *komatik*-ride. The dogs grunted and whined at the added weight, but I was told not to mind, since there was plenty of dog-food at the camp.

On the following morning we left Native Point at about nine o'clock, taking with us Kooshoak, Muckik's son. Though there was not a high wind, there was a considerable roll and we all very nearly got sea-sick. As we pushed along through the green water, we saw many seals, countless hordes of Old-squaw Ducks, some bands of red-eyed walrus, which interested and thrilled me greatly. We passed by the flat little island, which the Eskimos called Kikkuktowyak, noting many Eiders and Old-squaws in the vicinity. We journeyed only about thirty miles that day, reaching a little cove not far from Leyson Point, where, in a place

well sheltered from the wind, we anchored. Jack Ford and I set out immediately to explore a cliff, which rose up some distance inland. We walked along the clean, limestone-pebble beach for quite a way, turned north between some lakes, which appeared to be quite deep, and finally found ourselves at the base of a crumbling limestone-cliff about fifty feet high, back of which the land stretched off in a barren, almost desert-like plateau toward a few lakes, which were lined with a little grass. Into the cove, where we had anchored the *Shookak*, flowed a little stream which we called Lake Brook. At the mouth of this stream many young King Eiders were seen. The numerous lakes along the shore were frozen by this time. In the afternoon we had a snow-flurry.

On the following day we began looking for the whale carcass, which we had come to find. Amaulik remembered where the beast had been wounded, and told us that we ought to find it without trouble. We set out from Lake Brook at about 4:45 A.M., and made our way close to the shore, looking carefully along the beach as we went along. At about nine o'clock we sighted a great flock of gulls circling about in a little cove. We turned the motor-boat in, scanned the edge of the water with our binoculars, and finally saw the gigantic torso sprawled among the kelp. Masses of gulls flew about it, dipping low, alighting on the broad back, and walking along the sand at the edge of the black mass.

We landed on *the whale*. As we walked over the flabby mass the Eskimos shouted in glee, and gave peculiar little dances expressive of their happiness at finding the coveted *shookak* or baleen. Personally I thought the stench was the worst I had ever smelled, though I was glad to have a look at the huge tongue, the tiny eyes, the monstrous tail and the oddly fringed whale-bone which lined the mouth. Amaulik set to work almost at once at sawing the jaws off. I had the pleasure of myself finding fully a quarter of the valuable baleen buried in the sand quite a way down the beach.

In spite of the excitement about the whale I managed to take a walk, and found that the nearby flats at low tide swarmed with shore-birds. Inland the country was decidedly barren, the only vegetation being found along the shores of the numerous lakes. The beaches were beautifully clean, being composed of glistening sand. When the tide went out, exposing the ocean's floor, I discovered a most remarkable series of formations, which seemed to me to resemble gigantic petrified cabbage-heads with leaves six or eight inches thick. The crowns of these "cabbage-heads" had, of course, been worn away by erosion, exposing the very hearts. Pieces of the crumbling formations were lying about everywhere and they made walking difficult.

The Eskimos killed a Polar Bear, which had come to feed on the carcass of the whale. Naturally we called the cove, in which we were anchored, *Whale Cove*.

On the following day, September 21, at about noon we set out for Seahorse Point. As we journeyed eastward, the land gradually became higher and more rocky. I could not tell exactly when we rounded Leyson Point. In fact our course seemed to change so little, as we made our way along the southern coast, that I could not help feeling that the charts, which we had, were wrong. At about 2 o'clock in the afternoon we passed some strange caverns, which opened and led deeply back into the faces of some high cliffs. We came close to one of these caverns and looked back into its black recesses. By this time we had left the limestone country well behind us. The ridges here were all of granite. In the distance loomed the imposing dome of Mount Minto, not a high mountain in reality, but decidedly noticeable by comparison. The water beneath us was deep. As we passed the shore we saw numerous sheltered coves, where at least a motor-boat could find an excellent harbor. What a contrast to the shoal, exposed region of Cape Low!

In the middle of the afternoon we rounded a high headland, where we saw two Polar Bears. After making a hasty landing, we all piled out and raced across the moss and rocks to the base of a cliff and watched one of the Eskimos stalk *Nanook*. He killed him without much trouble, and we had glorious bear-steak that night. The cliffs at this point had a somewhat columnar structure, and there were great heaps of talus at the bases. As I walked over the ground near the edge of the water, I noticed that my footfalls produced odd sounds under-foot. By jumping about I could tell that there were considerable hollow spaces under me. I questioned the natives about the matter, and they told me there are several places in the region where there are subterranean caverns.

We reached Seahorse Point before evening and dropped anchor in a well-sheltered inlet. We all mounted the top of a nearby hill and surveyed our surroundings. On the distant cliffs we could make out the forms of five Polar Bears.

On September 22 I spent much time in observing the country at this interesting place. I soon found that just off Seahorse Point there was a fair sized island, which was almost joined to the "mainland" at low tide. To the east of the Point there were other islands also, all of them small, as well as some slender peninsulas, which became islets at high tide. The whole region was decidedly rough. Along the Fox Channel shore were great banks of snow, which looked as if they had never completely melted, and stranded chunks of green ice. To the north were high cliffs, precipitous walls of gray-green and brown, which rose almost directly from the sea to a height of about three hundred feet. Here lived Duck Hawks and ravens. Northwest of Seahorse Point was a narrow fjord, now almost completely packed with ice, which led inland for a distance of three miles. The whole region was so decidedly different from that which my charts indicated, that I decided to make a detailed sketch-map. On September 23 I had a memorable experience with a Polar Bear, in which I learned that it is better to hunt *Nanook* with a rifle than with a shot-gun.

On September 24 we left Seahorse Point early in the morning to begin our return to the Post. After leaving the high cliffs we began again to see great flocks of Old-squaws. A little after noon we again found ourselves at Whale Cove and we spent some time "taking on" a small load of baleen. That evening we anchored at the mouth of a fair-sized stream nearby, which I later found made its way down from the barren interior through a very interesting gorge.

I had opportunity to explore this river on the following three days, because we were held up by head-winds. At its mouth the stream was about eighty yards wide at this season. In the spring, of course, it would be a mighty torrent. In following the river inland I had sometimes to walk along some very crumbly banks of limestone. About a mile in from its mouth the stream-bed turned sharply to the right into a gorge. Here erosion along the cliff-faces was so rapid, that bits of rock seemed constantly to be falling. The sound of this breaking off and slipping down of earth was not at all pleasant. A mile farther inland I came upon a spectacular chasm; a seventy-foot deep canyon, which the river and its principal tributary had cut through the rock just below two cataracts. When I first encountered this gorge I had one of the thrills of my life. I was not walking along the stream-side, but merely across the open country nearby. The whole region had for some time appeared to be merely an uninteresting, sterile stretch of tundra almost devoid of vegetation, such as one becomes accustomed to seeing in this section. All at once I heard the roar of a waterfall. I was considerably taken aback, but was scarcely prepared to find myself after a few steps forward, peering over the edge of a steep cliff down into an apparently bottomless pool of emerald-green water. The crest of the cliff, on which I stood, had such a deteriorated appearance that

I moved about with care. Nevertheless I made bold enough to drop several stones into the chasm; and I watched them as they swung from side to side in the water and made their way down, down, down, until they vanished from sight. I have no idea how deep this pot-hole below the falls actually was, but the whole gorge was so unexpected, especially on such an island as Southampton, and it was surrounded with such almost ominous mystery, that Jack and I couldn't help calling it Devil's Gorge, even though I wanted to name the river after Dr. Anderson of the Canadian National Museum.

By this time the weather was getting cold. The lower part of the gorge, where the water was quiet, was frozen so firmly that we could walk about on it without trouble, and when we tried to catch some of the tiny trout, which could be seen swimming about near the bottom, we found the ice to be a foot thick. The ice had formed in peculiar whorls in the upper part of the gorge. The natives told me that in the spring the whole chasm was so full of water, as to make the falls scarcely perceptible.

On September 27 at three o'clock in the morning we left Whale Cove. We reached Native Point late in the afternoon, and, since it was still light and the weather good, decided to go on across the bay to an anchorage to the south of Prairie Point. In Native Point Bay we encountered a herd of about twenty walruses, which we watched for some time, chasing them about with the motor-boat. We finally found a fair place to spend the night and dropped anchor at night-fall. On the following day we reached the Post at noon.

THE HEAD OF SOUTH BAY

Most of the month of October I spent about the Post, travelling to all the best hunting-grounds at Seal Point, Poorhouse Hill, and Duck Bay. The weather had grown steadily more wintry, of course, so that by the end of the month the natives were travelling everywhere on their *komatiks*.

On October 22 Amaulik Audlanat and I took a komatik-trip to the head of South Bay. Amaulik hunted for seals on the ice, while I walked inland to see what birds I could find. We had some difficulty in getting the dog-sled across the rough ice, for the Inlet was not yet frozen shut. The dogs fell into the water several times. The Eskimos were used to all this, and probably thought it queer that I had a serious expression on my face, when the newly formed ice sagged with our weight and when the *komatik* banged and whacked this way and that through the rough chunks; but at this time I was not yet an Eskimo and had yet a great deal to learn.

I found the region at the head of the Bay very flat. I followed the poorly defined, snow-buried banks of a stream for about four miles inland, and was amazed that, as I progressed, the distant Itiujuak seemed not to come at all closer. There were a few large stones, which one might use as landmarks; otherwise the landscape was exceedingly dreary. The stream-beds, which I followed, were well known to Mr. Ford and his son, who had trapped along them ever since they had come to the Island. I found there were two branches to the stream, one of which turned north a short way inland.

During most of November I spent my time learning the ways of Arctic Foxes, several of which I caught before the season was over. I was out nearly every day, and covered from four to fifteen miles in my visits to the line of traps.

THE TRIP TO EAST BAY

On November 22 Amaulik Audlanat and I left the Post with *komatik* and dog-team bound for the East Bay country, where we planned to hunt Barren Ground Caribou. The

weather was cold, and I suffered a good deal because of my nose, which had already been frozen rather badly. On the first day of this trip I learned more about the actual life of an Eskimo than I had learned in all my previous experience. At noon I helped to erect a temporary shelter from the wind out in the middle of a wide lake, and ate frozen raw fish with my tea. That evening I tried to be of assistance in the building of the igloo, but I wasn't of much account. That night I couldn't sleep (though I was warm in my caribou-skin sleeping-bag) partly because this new experience was so exciting and partly because a native by the name of Khagak, who had joined us at the happy hour of supper-time, snored so loudly, that I could not do anything but listen to him. We built our igloo not far from Itiujuak, which appeared upon closer inspection to be rather a high cliff.

On the next day Khagak left us. We made our way across the flat tundra, moving most of the time with painful slowness because of the softness of the snow. We looked vainly for Muckik, who should have joined us the previous evening. Finally, after going perhaps eight miles in several hours of travelling, we decided to camp for the night. Just as Amaulik started the igloo, Muckik came swooping in on his lightly loaded *komatik*, dogs barking, and sled-runners grinding merrily. All was jollity.

In the morning I was wakened by the singing of some native tunes. We began our journey farther into the *Tooktoo* (caribou) country at about nine o'clock. As we ambled along the men set a good many fox-traps and watched for signs of game. We saw virtually no bird-life of any sort. We made good time, while we were crossing the frozen lakes; but through the snow we usually plodded slowly, with the dogs whining and panting. In the early afternoon we came upon caribou tracks, many of them, at the edge of a big lake. The tracks were not fresh, but they encouraged us. Our *igloo* that night was built at the edge and in the shelter of a rocky ridge within sight of East Bay.

The sky-line here, as at Seahorse Point, was majestic. In the distance rose the familiar dome of Mount Minto, now to our southeast. Across the gray expanse of East Bay, almost frozen shut at this time, was the high land at Gore Point. As I looked at this bold knob I did not wonder that it had originally been named Gore Island. I could see, even from our camp-site, that East Bay was not correctly indicated on the charts. The open water in the middle of the Bay was *steaming* in the distance. Imagine weather so cold that the Arctic Ocean should steam!

On November 25 we were out all day, hunting caribou. In the course of our journeying, we went across a frozen channel to a nearby island, which is indicated on most charts and which should bear the native name *Tooktootok* (meaning 'Place of Caribou'). This Island I judged to be about six miles long. Along the edges it was low, but running almost its entire length was a considerable ridge, about three hundred feet high at its highest point. We saw many signs of caribou, but saw no animals. We visited this island twice. Fox Channel at this time was altogether open, but there was a good deal of ice piled roughly along the shore.

From Tooktootok I could see Gore Point very plainly, and in the distance Mount Minto. Beyond Gore Point, and obviously extending farther north than this Point, were two or three other necks of land which are placed considerably too far south on the charts.

On November 26 we went northward into the high country bordering Fox Channel. We surveyed our surroundings from bold eminences and could see a great distance in the clear atmosphere. The whole region was dotted with lakes of all sizes, most of them small, and I learned from my companions that the place was called "Koksaktok," meaning 'Place of Loons.' On the following day, after making our way again into the high country, we saw

our first caribou, and before nightfall had shot four, including a nice male. We saw also some ruins of the houses of the extinct Saglernmiut. On this day I had my first experience in driving the dog-team and *komatik*.

Thanksgiving Day we spent in our igloo. The weather had turned bad and we were obliged to stay in to avoid being lost or snowed under. The storm lasted until December 1. On December 2 we made one more try for caribou, but failed to find any. Then we started home. That day we got back to one of our former camps. The recent gale had filled the old igloo with snow, but we got to work and excavated it, and soon were comfortable for the night. On the following day, travelling through the wind with the temperature at 34° below zero, we finally reached the Post. I was glad to be able to wash my face once more.

During the winter I made several *komatik*-trips with the natives, but did not traverse any new country. The natives, too, travelled about a good deal in their hunting; but for the most part they went into country, with which all of us were by this time fairly familiar. In one of the trips Amaulik changed his course purposely so as to collect for me a specimen of one of the large willow-trees which were known to grow along the valley of the Kirchhoffer River far in the interior.

TRIPS TO THE FLOE

During late winter and early spring I made several trips to the floe with the Eskimos. On nearly all of these we either stopped at, or went close to, Bear Island, so I became familiar with that barren piece of ground.

Though the trips to the floe were exceedingly interesting from the standpoint of adventure, they did not add much to my knowledge of the geography of the island, so I will not discuss them in detail here. Once or twice we came very near to Native Point, and then again, went westward across the frozen expanse of South Bay almost to Munnimunek Point, and the "peculiar shed-like hill" nearby.

As the season advanced, the edge of the floe across the mouth of South Bay gradually receded northward, the ice being broken off by the action of the tides, wind, and waves.

VAIN ATTEMPT TO REACH FOX CHANNEL

On May 10 Tommy Bruce (an Eskimo) and I loaded our *komatik* with a week's rations and a frozen *Netchek* (seal) for dog-food, and started for the high land along the shore of Fox Channel, where we hoped to find White Gyrfalcons nesting. We left the Post at about 10 o'clock in the morning and headed the dogs for the knob at Itiujuk. We reached the shelter of this high cliff at about five o'clock P.M., having had a pleasant trip, seen a few ptarmigan, and caught an Arctic Fox alive in a shallow burrow out on the open tundra.

The weather was agreeable most of the morning, but in the early afternoon the wind began to blow and the snow to drift badly. We found to our dismay that we had forgotten our *panas* (snow-knives) and that the tent-ropes were very old and frayed. Nevertheless we pitched camp, fastening the tent-ropes with heavy stones sunk in the snow.

I found the cliff at Itiujuk to be about two hundred feet high, a precipitous wall of rock facing about east, in the sheltered niches of which Snow Buntings were roosting.

On the following day we tried to push farther to the east in spite of the wind, but the dogs could not make any headway, we soon became frightfully cold, and at last decided that we had better make camp before leaving the shelter of the high land. Had we not stopped when we did, we might have run into serious trouble, for the wind increased hourly to a terrific gale. The temperature was not low, presumably not becoming colder than +18 F.,

but it snowed heavily, blew fiercely, and our tent was first almost blown away, then all but buried. It was providential that we were in the shelter of the cliff, over the uppermost crest of which the snow curled ceaselessly and ominously.

In spite of the fierce wind, I tried to do some hunting, and actually got two Arctic Hares on the crest of Itiujak on the following day, though in retrieving one I had the weird experience of nearly stepping off the edge of a cliff into snow-filled space. We also got some ptarmigan, and I succeeded in collecting a few specimens of small birds from the flocks of early migrants, which fluttered about seeking shelter from the storm.

On May 22 we decided we could not go on. The wind was still blowing, dog-food was all gone, and our tent was on the point of blowing away at any moment. Had we not forgotten the snow-knives, we might have made an igloo; as it was, we were almost at the mercy of the elements. Disappointed at our failure, we started back to the Post through the merciless wind, which was, however, now at our backs. We found that our friends had worried about us, for we had been out through one of the worst gales of the season. On the following day the weather became, if possible, even worse. Not until the evening of the 24th did the clouds disappear and sunshine return. The drifting of the snow had utterly changed the aspect of the whole landscape in the region at the head of South Bay.

TRIPS TO KOODLOOTOK RIVER

During the spring and summer I made several walking trips to the mouth of the Koodlootok River, about seven or eight miles west of the Post. In reaching this interesting hunting-ground I always walked along the shore of Duck Bay,²³ or crossed the tundra farther inland. Duck Bay I found to be quite shallow for some distance out from the shore. The land rose very gradually, first into a narrow grassy belt which extended three hundred yards or so inland from the shore, then into a series of low gravel-ridges, which became higher farther inland. The stream which emptied into Duck Bay was very small at all seasons of the year, save during the early summer, when the melting snow and the frequent rains transformed the trickling brooklet into a rough, brawling torrent, which could not be waded in safety. About a mile back from the edge of the bay this stream made its way through a short gorge, the banks of which were heaps of smooth gravel.

Koodlootok River itself was a much larger stream. At the mouth the banks were of clean gravel, almost devoid of vegetation. Farther inland there was a considerable growth of willows along the bank, some of which attained almost the height of a man in the more sheltered places. Here, I learned, redpolls nested. Between the valley of the Koodlootok and the basin of Duck Bay was a rather high, exceedingly barren plateau.

TERN ISLANDS AND BEAR ISLAND

During two of my trips to the mouth of the Koodlootok River I walked over the ice in such a way as to include the two little Tern Islands in my itinerary. These islands were situated in about the middle of Duck Bay. The larger was about a quarter of a mile across, and reached a height of about twenty feet. At the edge it was very rocky, the shore being strewn with big boulders. Farther up it was more sandy or gravelly, and on the very crest it was covered with grass and low flowering plants. The smaller island was only about half as large, was not nearly so high, and had little or no grass on its crest. Only the larger

²³Duck Bay is not named on my chart, Pl. I. It really is not a "bay" but the body of water just west of Seal Point, in which the two small Tern Islands are situated.

island was used as a nesting place, by the terns, Old-squaws, Northern Eiders, and Mandt's Guillemots.

Bear Island, which I visited several times, was about half or three-quarters of a mile long, and perhaps fifty feet high at its crest. Along the outermost points of the island were rows and piles of boulders, though most of the shore-line was a gravelly or sandy beach. The higher part was covered with grass and flowers in summer. In some of the depressions were fair-sized puddles, or lakes, about which a few small birds lived. All the terns, gulls and larger birds, which formerly inhabited the island in great numbers, had long since disappeared as a result of the repeated visits of the natives.

KIRCHHOFFER RIVER

During the middle of the summer I made one visit to the mouth of the Kirchhoffer River, and found it to be the largest stream in the vicinity of the Post. The banks at the mouth were entirely of gravel. The course of the stream seemed to be somewhat circuitous. In the distance I could see a sort of gap in the highest gravel hill, through which the water flowed. I did not have the opportunity to see the fifty-foot fall, which the river is reported to make a short way back from its mouth. The country about the river-mouth was very barren; farther back, however, so I was told by the natives, the banks were lined with grass and stunted willow-bushes.

SECTION 3. BIBLIOGRAPHY

The following list is not by any means a complete Bibliography. Such a Bibliography would include hundreds of titles covering the general fields of Ornithology, Mammalogy, Botany, Geography, Geology, Ethnology, and so forth; and would furthermore include the titles of nearly all the published journals, treatises, reports, and recollections of Arctic explorers, whose names are legion. The list here given only presents the titles of such works as have been consulted in connection with the preparation of Part I, and Part II, Section II, of this Volume. Definite citations of many of these papers are given by the writer in the preceding and following parts of this work. Bibliographical lists will accompany the sections dealing with Mammals, Insects, etc.

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Fig. 1



Fig. 2



Fig. 3



Fig. 4

SOUTHAMPTON ISLAND ESKIMOS OF THE AIVILIK TRIBE

FIG. 1. "Tommy Bruce," who made the Cape Kendall Blue Goose sub-expedition.

FIG. 2. Amaulik Audlanat, better known as "John Eil," who accompanied the author to Cape Low, Seahorse Point, and East Bay.

FIG. 3. "Bye and Bye," and some of the Aivilik children, at Bear Island.

FIG. 4. Amaulik Audlanat (left) and Muckik at East Bay. They have just set a fox-trap.



Fig. 1



Fig. 2



Fig. 3



Fig. 4

ESKIMOS

FIG. 1. Two young Aivilik girls at the entrance to their *igloo*, Bear Island. The girl to the left is carrying a baby on her back.

FIG. 2. Muckik skinning out a *Netchek* or Ringed Seal.

FIG. 3. The *Oogjook*-skin (Square Flipper Seal-skin) tent, or *tupek* of the Aivilik Eskimo, as it appears in summer.

FIG. 4. Skull of one of the extinct *Saglernmiut*, photographed exactly as found at Native Point.



Fig. 1



Fig. 2



Fig. 3



Fig. 4

VIEWS ON SOUTHAMPTON ISLAND

FIG. 1. The pretty flowering plant, *Dryas octopetala*, photographed by James Thom of the Hudson's Bay Company.

FIG. 2. A rock-fern, photographed at Poorhouse Hill, near the Post.

FIG. 3. Hill at Native Point, composed of fragments of limestone.

FIG. 4. The gravel plateau of Itiuchuk, inland from Prairie Point.

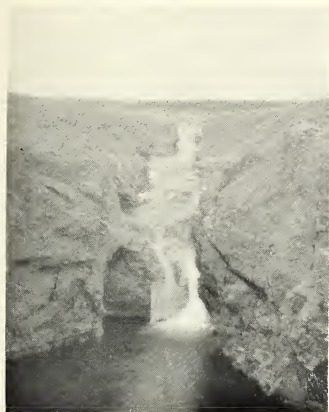


Fig. 1



Fig. 2



Fig. 3



Fig. 4

SCENES ON SOUTHAMPTON ISLAND

FIG. 1. Falls in the gorge of the Anderson River, photographed in late September, 1929.

FIG. 2. Itlujuak in a blizzard, photographed in late May, 1930.

FIG. 3. The flat country near Cape Low, Noovoodlik in the far distance.

FIG. 4. Cliff at Seahorse Point.

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By GEORGE MIKSCH SUTTON

SPONSORED BY MR. JOHN BONNER SEMPLE

1929-1930

PART II, ZOÖLOGY

SECTION 1. THE MAMMALS OF SOUTHAMPTON ISLAND

By GEORGE MIKSCH SUTTON and WILLIAM J. HAMILTON, JR.

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BY GEORGE MIKSCH SUTTON² AND WILLIAM J. HAMILTON, JR.

(Plates VI-X)

MAMMALOGICAL STUDIES ON SOUTHAMPTON ISLAND PREVIOUS TO 1929

Most of the earlier explorers who landed upon Southampton Island, or voyaged in the surrounding waters here and there, mention mammals in their journals, and the reports upon some of the expeditions include *Appendices*, listing the mammals encountered or collected, sometimes accompanied by extensive annotations. Among the writings of the earliest explorers such conspicuous animals as whales, walruses, and Polar Bears receive considerable comment; the smaller mammals are not often mentioned, save in lists, which are intended to include all the forms known to occur within a given region. Very few really complete lists of the mammals of this region have appeared, and to the best of our knowledge no complete list of the mammals of Southampton Island has been prepared prior to the preparation of the present paper.

1610. The writings of Captain Henry Hudson and Abacuk Prickett pertaining to Hudson's last voyage contain a few references to "stores of Seales," "Beares," and "Deere" [caribou] seen or shot in the northern part of Hudson Bay. These mammals are, on the whole, mentioned oftener than the birds.

¹The authors are indebted to several persons and institutions for assistance in the preparation of this part of the work. Among those who have helped us in one way or another are: Dr. Albert Hazen Wright of Cornell University, Dr. R. M. Anderson of the Canadian National Museum, and Mr. Kenneth Doult of the Carnegie Museum. The Division of Mammals in the American Museum of Natural History, N. Y., the United States National Museum at Washington, D. C., and the Carnegie Museum have loaned us material for comparison. Captain George Comer, of East Haddam, Connecticut, has given us a briefly annotated list of the mammals he encountered on Southampton.

²The portion of this monograph prepared by the senior author has been presented to the Graduate School of Cornell University in partial fulfillment of the requirements for the Degree of Doctor of Philosophy.

1612. Comparatively little has been written about the voyage of Sir Thomas Button, and, so far as we know, no personal narrative was ever published. Captain Luke Foxe, however, has given us a most entertaining account of the voyage in his "The North-West Fox," and here we find numerous references to mammals, such as those to "3 Deare," "divers Beares," and "Wolves" seen in the winter, and to "5 white Beares" seen at Mansel Island. These references we find in Miller Christy's reprint (1894) of Foxe's account in his *Voyages of Foxe and James, etc.* Just where Foxe got the material, upon which he based his account of Button's voyage is not altogether known, but the account is most readable, and is, we believe, usually considered fairly accurate.

1615. William Baffin (mate and associate of Robert Bylot) gives us several interesting notes upon the marine mammals found in the waters to the east of Southampton. These mainly concern Atlantic Walruses seen in the region of Seahorse Point during the summer. On July 16, 1615, when Bylot's ship was just south of Cape Comfort, the crew must have seen many of these creatures, which Baffin calls "Morses." Baffin tells us (see Markham, 1881, p. 133): "Among this ice we saw som store of *Morse*, som upon the ice and other in the water, but all so fearfull that I think little good would be expected in hope of killing som. They are so beaten with the *Saluages* that they will not suffer nether ship nor bote to com neare them."

1620. According to Lauridsen, Jens Munk's writings include a few references to game-mammals and birds, which were used as food, especially to bears and such species as were found along the west coast of Hudson Bay to the southwest of Southampton at "Munk's Winter Harbor" [the mouth of the Churchill River].

1631. In the colorful writings of Captain Luke Foxe, who is thought by some to have given the name Southampton to the Island, we find many references to the mammals of northern Hudson Bay. Foxe speaks of seeing many "sea-mors" [walruses] near Mansel Island, "white Beare" at "Carie Swan's Nest" [Coats Island], and mentions "Seales," whale, and "Reine Deere" here and there throughout the narrative.

1742. Christopher Middleton must have seen some interesting mammals during the course of his voyage through Sir Thomas Roe's Welcome and at the time of his naming of Repulse Bay and Frozen Strait, but he tells us little about them. A few observations upon change of pelage in the fox, hare, and weasel are made in one of his published writings (1852, p. 128).

1743-1751. The earliest important work dealing with the mammals of the Hudson Bay region in general is George Edwards' *A Natural History of Uncommon Birds and Some Other Rare and Undescribed Animals*. The work was published in four volumes. In it were figured a few mammals from Hudson Bay, some of which were thus for the first time really made known to the scientific world. The colored illustrations of various species were accompanied by good descriptions, but the names given were English names, so it became the task of Linnæus to give binomials to most of these. Linnæus in some cases exclusively referred to Edwards' figures; in other cases he cited other authors in addition. According to Richardson (1831, II, p. ix) the material, upon which Edwards based his illustrations and descriptions, was received from a Mr. Alexander Light and a Mr. Isham, "who, during a long residence, as Governor of various forts and trading-posts, employed his leisure hours in preparing the skins of beasts, birds, and fishes."

1746-1747. During these years, Captains William Moore and Francis Smith voyaged in search of the coveted North-West Passage in the ships *Dobb's Galley* and *California*, passing northward along the west coast of Hudson Bay to about the latitude of Southampton

Island. In the following year appeared two reports upon the expedition, one by a man known as "Drage" or "Charles Swaine," apparently the Clerk of the *California*; the other by Henry Ellis. Swaine's account (in two volumes) contains much information on the mammals, chiefly on pages 174-178 of Volume I. Ellis's account (also in two volumes) includes not only some illuminating paragraphs upon various mammals and birds, but also some very interesting illustrations of such species as the Wolverine and Canada Porcupine. Ellis's account of the "white bear" (p. 41) is so entertaining that it is quoted in its entirety here: "The White Bear is a Creature very different from the common Bear; having a long Head, and a Neck much thinner than other Creatures of that Kind; It is said to make a Noise, not unlike the barking of a Dog that is hoarse: There are different Sizes, great and small; their Hair is long and soft as Wool; and their Noses and Mouths are black, and so are their Claws, they swim from one Field of Ice to another, and dive under Water for a long Time. Near the Sea Coast they feed chiefly upon dead Whales; but on Shore, on anything they can get."

1769-1772. During these years, Samuel Hearne made three overland journeys to the northwest of the mouth of the Churchill River, in search of minerals and for purposes of exploration. The report upon these trips, which appeared in 1795, does not give us definite data upon the Southampton region proper, but the final chapter gives us a detailed account of the animals, with which Hearne had become acquainted on his journeyings, and some of his remarks are upon species found also about Southampton and are therefore of interest.

1771. Thomas Pennant's *Synopsis of Quadrupeds* contains much information upon mammals found in the region of Hudson Bay.

1819. Following the report upon Sir John Ross' first *Voyage of Discovery, etc.*, is an *Appendix II*, (author not stated) containing an article on birds and mammals observed about Baffin's Bay.

1820. W. Scoresby's *An Account of the Arctic Regions with a History and Description of the Northern Whale Fishery* does not primarily deal with the whale-fisheries of Hudson Bay, but the account is interesting, because it includes dissertations upon several well known Arctic mammals, such as the Polar Bear, Caribou, Greenland Whale, Walrus, and so on.

1821. On Captain W. E. Parry's second voyage, he visited the eastern and northern parts of Southampton Island, and Melville Peninsula to the north. The general account of the journey includes a few notes on the natural history, especially of Melville Peninsula. An *Appendix* to the published journal of this voyage, which appeared in 1825, and which was written by John Richardson, contains "An Account of the Quadrupeds and Birds" found on Melville Peninsula, especially at Winter Island and Igloodik. In George Francis Lyon's *Private Journal, etc.*, published in 1824, are also to be found several references to the mammals and birds seen on this expedition. Parry, Lyon, and Richardson, then, all give us statements as to the mammals encountered during this one voyage.

Among the most interesting of these notes are those given by Lyon, who tells us of a bear seen on the ice in Frozen Strait on August 13 (p. 44); of Narwhals and White Whales seen on the same date, the latter at the "Narrows"; of several "rein-deer" and a fox "killed by one of the *Fury's* dogs" (p. 46); and of whales [probably Greenland Whales] seen in the comparatively shallow waters of Duke of York Bay on August 17 (p. 48).

1823. The report upon the voyage of Sir John Franklin (1819-22) added much to our knowledge of the mammalian life of the Arctic. The narrative itself contains a few notes upon the natural history of the Barren Grounds, and an *Appendix*, by Joseph Sabine, is written "on various subjects relating to Science and Natural History."

1824. During this year, George Francis Lyon (who had also been on Parry's Second Voyage) made a vain attempt to reach Repulse Bay. In the very interesting account (1825) of this expedition we are given many notes upon mammals seen on Southampton Island and in the surrounding waters. Notable among these references are those to "five deer" seen south of Cape Comfort on August 24 (p. 50); to walruses seen near Seahorse Point (p. 52); and to White Whales noted apparently somewhere in Evans Inlet on August 26 (p. 54). One of the illustrations (facing p. 29) depicts a Polar Bear on the ice, a ship in the distance. The title of this picture is: "View of Terra Nivea in Hudson's Strait."

1829. The first volume of *Fauna Boreali-Americana*, treating of the Quadrupeds, was written by John Richardson. The data gathered on Parry's several voyages, on Ross's first voyage, and on the voyages of Sir John Franklin were incorporated in this work and much original matter appeared concerning the mammals of the Arctic regions of America.

1835. The narrative of Sir John Ross's "Second Voyage" in search of a North-West Passage (1829-33) contains many notes on the mammals of the region north of Hudson Bay, especially about Felix Harbor, Boothia Peninsula. The *Appendix* to this narrative, written by James Clark Ross, contains a systematic account of the collections and observations made on the voyage.

1833-1836. In 1836 appeared Richard King's narrative of the expedition (1833-35) headed by Captain Sir George Back to the Mouth of the Great Fish River. In this narrative King gives us much information on the mammals encountered on the Barren Grounds on the mainland to the west of Southampton Island. Captain Back's own narrative of the same expedition appeared during the same year, but Back's references to the mammals are as a rule indefinite, and the list of species, written by John Richardson, which accompanies the account, unfortunately is often without annotations.

During the course of Captain Back's journey (1836) toward Repulse Bay in the *Terror*, many mammals, especially seals, walruses, and whales must have been seen, and reference to these may have been made in the narrative, published in 1838, which we have not seen. Barrow's review of the journey, with several excerpts from the diary, gives us no notes upon any of the mammals of the region.

1846-1847. During these years, Dr. John Rae made an expedition to the shores of the Arctic Ocean. He sailed along the western coast of Hudson Bay from York Factory to the Arctic coast. He wintered at Repulse Bay, not far to the northwest of Southampton. His narrative (1850) includes many notes upon the mammals seen in the region, and the *Appendix* includes an annotated list by John Edward Gray of the mammals collected. Some of the birds taken on this expedition are still preserved in the British Museum. A number of these, labelled *Repulse Bay*, were almost certainly actually taken farther south in wooded country; so also some of the notes upon the mammals may possibly apply to regions south of Repulse Bay.

1865. J. E. Nourse's *Narrative of the Second Arctic Expedition made by Charles F. Hall*, etc., (1879) contains many notes upon the game-mammals of the region about and to the south of Repulse Bay. Hall visited Southampton once, in June, 1865.

1881. William H. Gilder's story of Lieutenant Frederick Schwatka's overland journey (1878-80) from Chesterfield Inlet to King William Land and return contains many notes upon the game-mammals of the region.

1885. Dr. Robert Bell's Appendix II to the Report of the Canadian Geological Survey upon the Geology, Mineralogy, Zoölogy, and Botany of the Labrador coast, Hudson's Strait and Bay, gives us a list of the mammals of the vicinity of Hudson Bay and Labrador.

1888. In this year appeared Dr. John Rae's paper, "Notes on Some of the Birds and Mammals of the Hudson's Bay Company's Territories and the Arctic Coast" published in the Canadian Record of Science. Here we are given notes upon a few species of mammals in the region of Melville Peninsula. The same paper, with a few changes and omissions, was published again in 1890, in the Journal of the Linnæan Society of London.

1900. The appearance of Edward A. Preble's *A Biological Investigation of the Hudson Bay Region* (1902) gave us at last a complete report on the mammals of this part of North America. Preble together with his brother, Alfred E. Preble, made a personal trip to Hudson Bay during the summer of 1900, preparatory to the publication of this paper. These two men studied the west coast of the Bay, the former as far north as the vicinity of Cape Eskimo, taking copious notes and making extensive collections. Preble did not reach the latitude of Southampton, but he entered the Barren Grounds just north of Churchill. Preble's paper is of great value to us, not alone because of the large amount of information it gives us about the mammals themselves, but because it presents such a careful study of the Life-Zones of the region, such a well prepared résumé of the biological work that had been done, and such a thorough bibliography. Preble's work may be called a classic of its kind.

1904. It is regrettable that in his report (1906) on the cruise of the *Neptune*, Alexander P. Low has not given us a list of mammals, similar to the list of birds offered in Appendix II. In the chapter on *Whaling*, brief paragraphs are given concerning the various kinds of whales, seals, and walrus found about Hudson Bay and the Arctic Archipelago, but these remarks are tantalizingly sketchy. There are very few comments upon the mammalian life anywhere in the narrative, though seals, whales, walrus, and Barren Ground Caribou are mentioned in connection with the excursion to Southampton Island (pp. 32-33), and Polar Bears are spoken of at several points (pp. 16, 58, 65, and 128).

1909. Ernest Thompson Seton's *Life Histories of Northern Animals* contains much of interest to the student of the life of Arctic mammals. This work is not only a compilation of notes from many sources, but it includes also a vast amount of original material. There are no direct references to Southampton. Seton's *Lives of Game Animals*, which appeared in four volumes from 1925 to 1929, also presents a great deal of interesting material. We have consulted Seton's works constantly in working up the present paper.

1910. Captain George Comer made several whaling-trips to the Southampton region from the year 1893 to 1920. In 1910, he gave us a "Geographical Description" of Southampton Island, wherein were incorporated a few remarks upon Barren Ground Caribou. Captain Comer has been good enough to let us go through all of his personal diaries and he has written down for us some of his recollections of the mammals he encountered in the region.

1916. During Captain Henry Tuke Munn's sojourn on Southampton Island, he collected many specimens. We do not, however, know where these specimens are at present. Munn tells us (1919) a good deal about the mammals he saw, heard of, or collected at Southampton, but presents no complete list.

1922. Dr. Therkel Mathiassen was not interested primarily in natural history during his stay of six months on Southampton. He has given us (1931) an interesting résumé of the mammal-life of the Island, however, which comes as close, perhaps, to being a complete list as any that has been prepared. Listed here (p. 27), some with brief annotations, are the "caribou, bear, wolf, ermine, and lemming"—all terrestrial forms, and whales, walrus, White Whales, narwhals, and seals among the marine forms. He calls attention to the ab-

sence of the Musk-ox, Wolverine, and "marmot" [spermophile], all three of which species are to be found on the mainland west of Southampton.

1928. In John Dewey Soper's *Faunal Investigation of Southern Baffin Island*, not many direct references are made to the mammals of Southampton Island, but there are excellent discourses upon the life-histories of several species found also at Southampton and in the waters adjoining both Baffin Island and Southampton. Soper's work is the result of a long experience in Baffin Island, and the wealth of data presented in this paper have furnished us much interesting comparative material, as well as inspiration to write accounts which may prove to be equally readable and informative.

1929. The senior author's chief interest, during his sojourn on Southampton Island from August, 1929, to August, 1930, was in birds. He was able, however, to devote a great deal of time to the mammals during the winter, when bird-life was scarce, and he made a fair-sized collection of specimens.

When the senior author considered the matter of working up these collections, he decided it would be wise to collaborate with someone, who was interested in the taxonomy as well as the life-history of the animals. He therefore asked Dr. William J. Hamilton, Jr., an Instructor at Cornell University, to assist him. Dr. Hamilton's contributions to the following paper have been so extensive, that it seemed only fair that he be named as co-author.

In the following List of Species, it will be noted that the pronoun *I* rather than *we* appears in many places, especially under the heading of *Records*. This, it will be readily understood, is because the field-notes were made only by the senior author and use of the pronoun *we* might be misleading under the circumstances. Dr. Hamilton, however, is almost entirely responsible for the taxonomic remarks offered in the following pages.

THE MAMMALS OF SOUTHAMPTON ISLAND

LIST OF SPECIES³

BY GEORGE MIKSCH SUTTON AND WILLIAM J. HAMILTON, JR.

Class **MAMMALIA**.

Order **INSECTIVORA**.

Family **SORICIDÆ**.

Genus **SOREX** Linnæus.

*Sorex*⁴ sp.? LONG-TAILED SHREW.

Eskimo Name: The Eskimos with whom I came in contact had never seen any sort of shrew on Southampton Island, but most of the Aivilikmiut, who had lived in the Repulse Bay country, were familiar with the small, soft-furred creature they called the *Oogjewnuk*, the color, size, and quick movements of which they were able to describe in minute detail. *Oogjewnuk* is probably a modified form of the word *Oogjuk*, the name of the Bearded Seal or Square Flipper. It is difficult to believe that the Eskimos can see any resemblance between these very different mammals, yet the similarity of the two words may indicate that the Eskimos know of some physical resemblance or of some quality which the two creatures have in common.

Status: Some species of shrew apparently is a fairly common mammal in the Repulse Bay region. While it may also occur rarely on Southampton Island, I am certain it did not live anywhere about South Bay during my stay there, for I set lines of traps in all sorts of places expressly to capture one of the creatures, and failed even to see a track in the mud or snow. The Eskimos, too, assured me that the *Oogjewnuk* was not to be found on Southampton.

An old man, Angoti-Marik, gave me the best description of the creature. In telling of its strength and vigor he cupped his hands one over the other and, simulating an effort to keep his fingers tightly shut, showed how the little animal would nose about and finally pry its way to freedom. He told me that it was much smaller than a lemming, that it had a snout, that it could not see, and that it was dark in color.

Mr. Ford called these animals *Shoe Crops*. The significance of this rather funny name I do not know.

Other Records: No writer mentions seeing or taking a shrew on Southampton Island. According to the distributional maps given us by Jackson (1928, pp. 39 and 67) the shrew found at Repulse Bay is likely to be either *Sorex cinereus cinereus* Kerr or *Sorex arcticus arcticus* Kerr, both of which species apparently have been taken as far north along the west coast of Hudson Bay as York Factory. Since *cinereus* is known to range northward to the coast of the Arctic Ocean not far west of the Repulse Bay region, it may be that it occurs also to the eastward throughout Boothia-Felix and Melville Peninsula.

Richard King (1836, II, p. 17) tells us of a shrew taken at the mouth of the Great Fish

³The order and nomenclature of the present list follows that of Gerrit S. Miller's *North American Recent Mammals* (1924).

⁴Species given in Italics are such as were not collected by the senior author, nor thought by him to have been taken on Southampton, but which may occasionally occur on the Island, or in the general region of the Island.

River (the Back's River of most modern maps) not far to the west of Repulse Bay. He says: "A specimen of Forster's shrew-mouse, *Sorex Forsteri*,⁵ the smallest quadruped the Indians are acquainted with, was found here, the skins of which animal they carefully preserve in their conjuring bags."

Order CARNIVORA.

Family URSIDÆ.

Genus THALARCTOS Gray.

1. *Thalarctos maritimus maritimus* (Phipps). POLAR BEAR.

Eskimo Name: The Eskimo name of this, one of the best known animals of the Arctic, has been in wide use for so many years that it is heard today almost as commonly as the English name, at least among trappers and voyagers in the North Country. The customary spelling of the word is, I believe, *Nanook*. Soper (1928, p. 29), however, spells it *Nannok*, and tells us that Hantzsch spelled it *Nennok*. The etymology of the word I do not know.

Status: In many parts of Southampton Island, chiefly perhaps in the north and in the region of Seahorse Point the Polar Bear is today really an abundant animal. It is to be found along the coast or on the offshore islands, or swimming about in the water, sometimes some distance from land. It probably was much commoner formerly in some sections of the Island. There has been a good deal of hunting in the region of South Bay of late years, and so many bears have been taken here, that they have been somewhat thinned out. One of the little islands in South Bay has long been known as Bear Island, doubtless because bears were once seen there frequently; but bears are rarely seen there today. The bear's skin is a valuable article of trade, and is used by the Eskimos in a great many ways, so bear-hunting is a common pursuit among the natives.

Bears are not often seen inland during the summer. They stay close to or in the salt-water at this season. They may wander more widely in the fall, in search of food or of a sheltered place, where they may sleep during the coldest part of the winter. Along the eastern side of the Island, among the ice which is carried southward in the current of Fox Channel, the appearance and disappearance of the bears with the ice may assume somewhat the aspect of a migration; and it is said that in particular the male bears at some seasons wander away from their customary range, perhaps in search of food.

Some writers aver that only the female bears hibernate. We are not convinced that this is always, or even usually, the case on Southampton Island.

Records: As the *Nascopie* made her way into the harbor at Coral Inlet on August 16, 1929, she passed the big mass of rock known as Walrus Island, which lies at the mouth of South Bay. On one of the upper ledges of this forlorn spot a Polar Bear was reclining. He was massive in build, and he looked down at us with an expression of haughty indifference as he turned his long neck about. Flocks of gulls and terns were gyrating about him. He did not even rise in alarm as we steamed by. Nanook of the North Wind!

I had my first personal contact with a live Polar Bear on the very day of my arrival. In a heavy, strong crate near the shore, surrounded by an admiring but somewhat timorous group of Eskimo children, was an unspeakably dirty, foul-smelling, half-grown *Nanook*, ready for a trip to some zoölogical garden. The animal swung back and forth ceaselessly, mouth languidly open, eyes directed balefully this way and that, big paws treading heavily on the planks. I noticed that the children did not get very close to the crate, for the beast

⁵According to Jackson (1928, p. 40), *forsteri* is a synonym of *cinereus*.

had a way of raking his feet suddenly under the lowest opening and sometimes he growled savagely. Whenever he growled, the dogs went half-wild with excitement. The Eskimos carried the big crate down to the water's edge, whence on a raft, it was towed out to the *Nascopie*, and the crate and bear were given a thorough dipping in the sea, before they were hoisted to their place on the after-deck.

During the few remaining weeks of summer I learned a good deal about bears from the Eskimos. I did not, however, actually encounter the species again, until early in September on our trip to Cape Low.

On September 2 at Cape Low I examined fresh bear-dung not far from the high-tide mark along the shore. On September 5 at Four Rivers Tommy Bruce and his companions killed a female bear and her two yearling cubs along the shore about three miles northeast of our camp. The animals, when first seen, were ambling along, evidently searching for food. When they saw that they were being pursued they moved rapidly away, but they were too late.

On September 11 one of the Eskimos brought to the Post a bear, which had been killed inland at the headwaters of the Koodloutok River or at Mathiassen's Darkness Lake.

On September 20 at a sandy point near the mouth of the Anderson River we had a most interesting experience with a bear. We had just located the huge, foul-smelling carcass of a Greenland Whale, which had been killed the preceding July. The Eskimos had jumped about on the partly floating putrid mass and one of them, Amaulik Audlanat, had set to work to saw off the jaws, so as to get to the *shookak* or baleen. Jack Ford and I finally set out for a distant cliff of whitish, crumbling limestone, and had gone perhaps a mile, when with our binoculars we spied what appeared to be a bear, swimming toward the whale. By this time all the Eskimos but Amaulik Audlanat were out in the motor-boat's little tender, hunting seals. Jack and I reasoned that we could not run back in time to shoot the bear ourselves, and since the animal appeared to be swimming steadily toward the shore we simply watched from a good vantage point the exciting drama that was taking place. Evidently the bear scented no danger. All at once, Amaulik Audlanat dropped his saw, sank to his knees and scuttled to the farthest point of the sandy bar nearby, motioning wildly to his companions. Evidently he had seen the bear. Then he returned to the whale, snatched up what appeared to be the boat-hook, and started fastening something to the end of it. He did not even have a rifle. He was improvising a harpoon from that boat-hook and a big snow-knife in preparation for a hand-to-hand encounter with the bear.

Both Jack and I wondered how the affair would turn out. To run to Audlanat's assistance was out of the question. Suddenly a shot rang out, and we perceived to our surprise that the little boat-load of hunters had come up. The bear's head disappeared, and did not again show for perhaps three minutes. Then there was another shot, and another. Amaulik put down his harpoon. We finally saw them towing the bear to shore. Amaulik told us afterward that *he* would have got that bear with his harpoon, if someone else had not made so much noise with the guns.

The animal was a small male, the pelt was not very good. It evidently had been for some days coming to the carcass of the whale to feed, for its coat was not clean. There was a great hole in the side of the whale, where the bear probably had been gouging out the flesh. The lining of the bear's mouth, the lips at least, were black. As we skinned the animal, a flock of ravens, which had come to feed on the whale, circled about the carcass of the animal, probably attracted by the appearance, or smell, of the fresh meat and blood.

On the following day, at a place not far from Leyson Point, the Eskimo, Kyakjuak, killed a large and very handsome male bear on a cliff about a mile and a half inland from the salt-

water. We sighted this bear from a considerable distance, and made a special anchorage in order to get it. Once on land, most of the hunters went round a low knob of rock, in order to steal up on the unsuspecting animal. Others of us went directly, but slowly, across the open, so as to keep the bear's attention focused upon us. The plan was successful. There were only three shots. We had a very hard time pulling the great brute, which may have weighed half a ton, out of a crevice into which it had fallen. Its jowls and chest were stained a rich orange-color, perhaps from eating berries. The hair was in beautiful condition. The animal was very fat. In the stomach were quantities of berries, mushrooms, and some mosses or lichens, but not a particle of meat of any sort.

On September 22 Jack Ford and the Eskimos shot four bears at Seahorse Point. That morning, when we mounted a prominent ridge, whence we could survey the surrounding region, we sighted eleven bears at one time—single bears, bears going about in couples, and one group evidently composed of a mother and two of last year's young. I witnessed the stalking of one bear at close range, and was amazed at the quiet, unsuspecting behavior of the great brute. It was making its way slowly up the rocks. Amaulik Audlanat hoped he might get a photograph of it, and actually whistled to it once to make it turn its head. The stomach of this animal was filled principally with moss and lichens.

On the following day, three bears, a very large one and two smaller ones, were killed at Seahorse Point. And we must have seen a dozen more animals. It was on this date that I had a memorable encounter with *Nanook* myself. I had just collected a pair of ravens and a Duck Hawk, and was making my way round the edge of a small, partly frozen lake. A light snow was falling. All at once, I spied a bear, pawing in the turf. He turned to look at me, made an odd grimace by sticking his upper lip forward, and loped off up the slope, bound for a rounded rocky hill about half-a-mile away. I was a little excited by this close encounter, but it did not occur to me that I would see the bear again.

Within half an hour, I noticed a flock of ravens and gulls circling low over the crest of the rounded hill. Since there were among these birds some adult Glaucous Gulls which I very much wanted, I started across the tundra. After I had got to the crest of the hill I looked out over a long, narrow, ice-filled fjord. The birds were annoyed or frightened at my coming, and set up a loud calling. Then I perceived that what had attracted them was the partly eaten carcass of a large Harp Seal, lying on the rocks about one hundred yards from the edge of the water. Even then it did not occur to me that the bear had killed this seal.

Then I saw *Nanook*. Bottle-green in the clear water, swimming lazily about, he looked up toward me. But I think he did not see me. I was fascinated. Finally he lifted himself out of the water, shook himself like a great dog, sniffed the air, then, in the most deliberate manner, began making his way up the rocks to the seal. So very measured were his steps that he sometimes actually put one foot down on the other, and blinked his eyes as if half asleep. When I noted how near I was to the carcass of the seal, I marvelled that the bear could actually be coming back to feed.

As the bear moved slowly toward the seal, I made my way by short stages down the cliff, moving when the bear's head was turned the other way. I could foresee that I would be very near the animal by the time he had returned to his prey; near enough, perhaps, for a shot. The ravens, by this time, had circled away. The gulls, however, continued to dip down toward the seal and toward the bear's head, as if begging him for food. Annoyed at these importunities, the bear looked at the gulls with narrowed eyes, and once or twice actually stood up to take a pass at them with his broad front feet.

At length the bear was once more at the carcass of the seal, and I, after a series of hitch-

ings down the rocks, found myself at the edge of a fifteen foot precipice, just across a little gully from the bear. It gave me a queer feeling, whenever the bear looked directly at me, evidently wondering whether I could be animate or not, then turned away, nose lifted to the wind, which was blowing from across the fjord and therefore giving him no sign of my whereabouts.

The bear did not feed. Evidently he was agitated, probably because the gulls gave warning cries. I could write a long dissertation on my thoughts and reasonings during the following fifteen minutes. Briefly, I finally decided to try to shoot the bear with No. 4 shot, the largest shot I had. The discharge merely infuriated the creature. He rose to his hind legs with a terrific roar, swung about twice, striking the air viciously, then sank once more to his fore feet and made his way up the rocks. The leaden pellets had little more than torn the skin here and there. I was considerably frightened for a time, and was relieved to see the bear making his way off toward the outer shore. A quarter of an hour later, when I had regained composure and straightened out my stiff legs, I followed the animal; got to the top of the promontory in time to see him swimming strongly out to one of the distant islands; and at the last drop of blood of the trail saw a particolored weasel, which had also evidently been following the wounded *Nanook* to the sea.

The Eskimos told that Seahorse Point was a favorite rendezvous for Polar Bears, especially in the fall. Here they were known to gather to feed upon seals and other food, before seeking out some sheltered place, in which to sleep away the coldest days of winter. Many of the bears seen at Seahorse Point probably drift southward on the ice of Fox Channel.

On October 9 I saw a bear-track at the head of South Bay. On the same day one of the Eskimos killed a large bear nearby. On October 17 at Seal Point I followed the trail of two bears, which had swum across from Munnimunek Point, or from the Tern Islands. In the snow I could see how they had emerged from the sea, shaken off the water, and wandered about the cliffs. On leaving the Point they had gone out to its farthest promontory, then entered the water once more, perhaps heading for Prairie Point, seven miles away. On October 18 Amaulik Audlanat and Muckik each got two bears along the Fox Channel shore about forty miles east of the Post. On October 25 Sheeloo and his party saw four bears not far inland from the Post. They got two of these, one rather a small and decidedly white one, the other much larger and more creamy in color. On October 28 Keetlapik got a large one (stomach empty) at Seal Point. I might have shot this animal myself, had I not had the misfortune to break through the ice. I think I might have kept on hunting for some time without becoming disagreeably cold, for wet outer clothing freezes and forms a good windbreak, but seal-skin boots become wretchedly soggy and floppy when wet, and it is almost impossible to walk in them.

On October 30 two Eskimos brought in six bear-skins from the region of Cape Low. On the following day Kungualook saw the tracks of two large animals, which had been making their way toward Itiujuak on the harbor-ice. They had passed not far from the Post probably at night.

On November 1 Shookalook shot a large male. On November 3 Amaulik Audlanat reported that many had been seen near Native Point; and Keetlapik and Noah saw three, an adult (probably a female) and two young, making their way inland, not far from the Post. These animals were, perhaps, on their way to hibernate in dens.

On November 15 two of the Eskimo hunters drifted off on the ice east of Cape Low while after Polar Bears. They never returned. One of the men had been far out on the ice

when a change of wind started to carry the whole mass of ice out to sea. One of the men ashore pulled a canoe to the water's edge quickly, and paddled out before putting additional winter-clothing on. The Eskimos on shore eventually saw the canoe smashed in the ice and watched the forms of the men as they disappeared in the distance. To go after them in canoes in the rising wind would have been folly. Hunting *Nanook* is not always a pleasant experience.

On November 16 Father Thibert reported to me an interesting encounter with a bear at the southernmost of the Noovoodlik or "peculiar shed-like hills." He and some Eskimos were passing the base of the hill, when they spied a bear. On giving chase they found that the animal had been making what appeared to be a den in the snow. They chased it for about two miles before shooting it. It was so tired that it panted furiously by this time. Its stomach was packed with the flesh, skin, and blubber of seals. It proved to be a male.

On November 18 Sam Ford saw the tracks of a very large bear at Seal Point. On November 27 we saw tracks that may have been a week old at Tooktootok Island, just north of East Bay. On December 12 the tracks of a small bear were seen at the head of South Bay. The Eskimos told me that by this time most of the bears were "holed up" for the winter.

We heard no more of bears for some time. On February 8, however, tracks were seen by the Eskimos near Munnimunek Point. Sam Ford told me that this was an early record, and that the animal was probably a hungry male. Tracks were next seen at Native Point on March 2.

On March 4 Eskimos, who had just come in by dog-sled from the Cape Low region, reported seeing tracks of a mother bear and a tiny cub in the region of the southernmost Noovoodlik. The tracks were leading toward the nearest open water. I was told that in the southwestern part of the Island these gravel-hills are a favorite place for the female bears to make their dens. On March 12 Evaloo reported the tracks of a mother and *three* small cubs somewhere between the Post and Darkness Lake. On the following day Amaulik Audlanat saw the tracks of a very large animal (probably a male) in the same region. On March 16 Kyakjuak saw the trail of another large male not far from Cape Low.

On March 21 Muckik regaled us with an amusing tale of his finding that a bear had been sleeping actually under one of their igloos during the winter. The igloo is a temporary camping-quarter. While coming in to the Post, he found that a bear had just emerged from its winter-den under one of their old igloos. He told us, with smiles on his broad face, that the dogs had lain on the snow only a few feet above the bear, and had not been able to smell it.

On March 23 Jack Ford saw the trails of two mother bears, one with two and one with three small young, at the head of South Bay. The trail of a solitary animal was seen on the harbor-ice not far from the Post on March 26.

On March 27 Tapitai and Sheeloo brought in a tiny live cub from the Salmon Pond at the headwaters of the Koodloutok River. Unfortunately they did not tell us about this animal immediately upon arriving at the Post; by the time we had been told about it the dogs had utterly annihilated it, skin, flesh, and even bones.

On March 30 the trails of a female and one small cub were seen at the head of South Bay. On April 4 Eskimos, who had just come in from Seahorse Point, said they had seen several winter-dens along the deep drifts about Mount Minto. Sam Ford told me this was a favorite denning-ground of the animals, and that a great many young were to be found there at this season.

On April 16 Amaulik Audlanat and Pialak saw the fresh tracks of a bear between the Post

and Bear Island. On April 28 Kyakjuak and Pumyook told us of following many bear-trails along the shore of Fox Channel northeast of the Post; and of seeing a trough in the snow where a large bear had slid down a long embankment directly into the water.

On July 24 Amaulik Audlanat and his party returned with four bears they had killed on and about the ice, which extended in a somewhat broken sheet from Walrus Island to Cape Low. Here at this season many bears customarily are seen. They spend all their time, it appears, searching for seals, or basking in the sun, couched on the ice. From July 25 to 28 Amaulik and his party were again in the region of Walrus Island, hunting walrus. They got three bears on this trip. On July 30 Jack Ford and his party returned from a hunt, with five bears they had shot about the floe of Walrus Island. On August 2 Amaulik Audlanat and three other hunters shot three bears on the ice south of Bear Island.

From the foregoing account it will be seen that the Polar Bear is really a rather common animal on Southampton Island.

Annual Cycle of Activities: The Eskimos of Southampton, as well as Mr. Sam Ford, who is well acquainted with this part of the North Country, believe that all Polar Bears, males as well as females, hibernate as a rule. This statement is at variance with that of Soper (1928, p. 29) who says: "According to the Eskimo, polar bears are rarely present in winter along the east coast [of Baffin Island] and occur in largest numbers in April, when the males after spending the winter hunting seals on the ice of Baffin Bay and Davis Strait, approach the shores and the females with their cubs leave their hibernating quarters." I wish I could offer more positive proof for my belief; but we never saw any bear actually in its den, and there is no way of proving, so far as I can see, that a male bear taken near what appeared to be a hibernating den was actually in the process of entering upon a period of hibernation. Of one thing we are certain: that very few bears of either sex are to be seen during a period of the winter from about the first of December to early March. It may be that the male bears at this period go to some far hunting-grounds, to Coats Island, or to the masses of floating ice in the middle of Hudson Bay.

Assuredly the condition and behavior of the bears at Seahorse Point led me to think they were all preparing to go to dens. They were feeding constantly; they had a somewhat drowsy manner of going about (which may be characteristic of the brutes at any season for all I personally know); and that the whole region was admirably equipped with gulleys and fissures wherein bears could "hole up."

According to the Eskimos, the young are born in January. They are exceedingly small at birth, naked, blind, and helpless. I never saw a new-born young, to be sure, but was told that they are as small as, or smaller than, the spermophile of the Repulse Bay country. I learned that the young usually number two, but that three and four young have been known. They are led forth from the winter dens by their mothers in early or middle March. At about this time the males also appear, either emerging from their hibernation dens, or returning from their pelagic hunting-grounds. At this time bears are to be seen almost anywhere, either far inland, or at the edge of the floe; the males are usually ravenously hungry and make their way to the places where seals are most numerous.

It is the belief of the Eskimos that female bears give birth to young not every year, but every other year or even less frequently. Females accompanied with half-grown young were seen several times in the fall. Whether these females customarily hibernate *with* their young is more than I can say, but the young apparently accompany her up to the very eve of the hibernation period.

Throughout spring and summer bears are usually to be found in sections where seals,

especially *Netchek*, are common. In late summer, however, they consume a good deal of vegetable matter, and (as some authors have stated) probably eat lemmings, the eggs of sea-birds, and offal by way of variation.

The principal enemy of the Polar Bear is the Eskimo. Not only is bear-skin an important article of trade, but it is used by the Eskimos as a robe, rug, or mattress, and as a bottom, or cover, for the *komatik*-load; trousers, boot-soles, and other articles of clothing are made from it; the flesh and fat of the animal are prized as food, and the bones and teeth are put to many uses. I was told several times that the bear's liver is poisonous, so the Eskimos take care that their dogs are not permitted to eat it.

Other Records: Practically all the journals having to do with expeditions to this part of Hudson Bay mention Polar Bears here and there. Thus Abacuk Prickett tells us of "Beares" seen on Hudson's voyage in 1610; Foxe tells us of "5 white Beares" seen by Button on Mansel Island in 1612, and of "a white Beare" seen by his own party at "Carie Swan's Nest" in 1635. Scoresby (1820, I, pp. 517-526) gives us rather a lengthy discussion of the animal. Lyon (1824, p. 44) tells us of seeing a bear in the ice of Frozen Strait on August 13, and (1825, facing p. 29) gives us an illustration of a bear standing on the floating ice in his picture entitled "View of Terra Nivea."

Preble (1902, pp. 64 and 65) gives us an account of the species in the Hudson Bay region and says: "The female dens up in a snowdrift in the winter, brings forth her young about March, and soon afterwards leads them to the sea. The male is said to pass the winter at sea."

Low (1906, pp. 16, 58, 65, and 128) tells us a little about bears and bear-hunting among the Eskimos of the Arctic Islands.

Munn (1919, p. 54) took "over one hundred [bears] in the winter of 1917-18," at Southampton.

Soper (1928, pp. 29-31) gives us a good account of the species on Baffin Island, where it occurs "in largest numbers on the east, north, and northwest coasts," and tells us that the Eskimos believe the males do not hibernate, but spend their winters "on the ice of Baffin bay and Davis strait . . ." hunting seals.

Binney (1929, p. 19) says: "From the mouth of James Bay northwards, the Polar Bear is hunted and is the source of the greatest excitement among the Eskimos and their dogs. While the husky-dogs are frightened of wolves and will not eat their flesh, if they get the wind of a bear (*nanook*) they are after him like greased lightning and impede his escape until the arrival of the hunter."

Mathiassen (1931, p. 27) lists the "bear" among the terrestrial mammals of Southampton, but says nothing further about the animal.

Captain Murray told me that he once found a Polar Bear dead from an unknown cause at Cape Frigid. Mr. Ford told me that he had seen numerous bears both on Southampton and Coats Islands since his coming to this region.

Family MUSTELIDÆ.

Genus MUSTELA Linnæus.

2. *Mustela arctica samplei* Sutton and Hamilton.* SOUTHAMPTON ISLAND WEASEL.

(Plate VIII, fig. 3, dorsal and lateral views of skull)

Eskimo Name: Soper (1928, p. 31) tells us that the name *Terreak* is applied to the Arctic Weasel, *Mustela arctica arctica* (Merriam), in Baffin Island. This same word is in

*Sutton & Hamilton: Annals Carnegie Museum, XXI, pt. 2, pp. 79-81, March, 1932.

use among the Southampton Eskimos, but I spelled it *Teggeuk* or *Tuggeuk*. Its etymology is unknown to me. Since the name of the Arctic Fox, *Teregenuk*, is so similar, it seems reasonable that the two words are derived from similar or identical roots.

Status: The weasel is widely distributed over Southampton, according to the reports of the Eskimos. It is perhaps commoner, as a rule, in the rocky districts of the high, eastern part, than in the flat country of Cape Low. Its abundance usually parallels that of the lemmings so definitely, that it is difficult to make a statement that applies equally to seasons of all sorts. I recorded it personally only in the vicinity of the head of South Bay and at Seahorse Point, but specimens were brought in from several other localities, and I was told that it had been seen or caught in traps, or its readily recognizable trails observed in practically all parts of the Island. It had also been seen on Tooktootok Island near East Bay, several miles offshore, and on other small islands. It had never, however, been noted at Walrus Island.

Weasels are usually common during "good fox years." The reason for this is apparent. Since an abundance of foxes usually signifies an abundance of lemmings, by the same token it signifies an abundance of other predatory forms (birds as well as mammals) which depend upon these rodents for their food. During the winter of 1929-30, lemmings were more than usually common all over the Island, and there was, therefore, a notable abundance of foxes, weasels, and owls. During some seasons (I was told), when lemmings are scarce, weasels are nowhere to be seen.

The Eskimos were surprised at my interest in these little mammals. For a long time the fox has been so valuable by comparison as a fur-bearer, that the Eskimos now make no attempt to capture *Teggeuk* as a rule. They do not use its skin in decoration of their *kooletahs*,⁶ nor do they often use the teeth, claws, or any other part in their amulets. According to the records of the Hudson's Bay Company very few raw weasel-pelts have come from Southampton Island since the establishment there of the Post in 1924.

Records: Prior to the heavy snows of mid-September, 1929, I did not see any signs of weasels about the Post; nor did I record the animal at all during the course of our journey to Cape Low. When there came a heavy fall of snow, however, signs of weasels were to be noted here and there all about the head of South Bay. On September 12 I noted several trails (perhaps all of the same individual) leading to a burrow in the rocks about two miles east of the Post.

On September 22 at Seahorse Point I saw a parti-colored⁷ individual which apparently had been following the trail and licking up the fresh drops of blood of a Polar Bear, which I had slightly wounded with a shot-gun.

On October 4 I noted two trails in the snow. These were of different individuals, I am sure, for the tracks were of different sizes.

On October 8 at the cemetery near the Post I shot a male among the rocks. This animal, which was not at all fat, was parti-colored, though largely white. When first noted it was darting among the rocks. When it heard me, it stood upright at the entrance to a burrow under a flat rock, and looked at me, nose quivering and eyes twinkling. As it ran it held its arched tail high, though the plumed tip or brush apparently touched the snow or rock lightly with every leap.

⁶These *kooletahs*, which are a sort of shirt or blouse with hood attached, are usually made of caribou skin, or a cloth called duffle. Formerly the *kooletahs* were considerably decorated with designs of one sort or another; this custom of adding designs is, like that of wearing the amulet, disappearing among the Southampton Eskimos.

⁷This animal was about half brown and half white.

On October 18 and 21 several trails were noted. On October 30 two trails were followed for some distance at Seal Point. One of these led virtually all round a small, partly frozen pond, down to the water's edge, out on the thin ice for a short way, then into a burrow toward which a lemming-trail also led. On October 31 Jack Ford saw many tracks at Prairie Point.

During the second week of November there apparently was an immigration of weasels in the vicinity of the Post. On November 9 one or two trails were seen. By the 13th, however, trails were to be seen everywhere, dozens of them wherever we went, most of them following the ridges or leading from one high place to another. Trails that led about the flat prairie-country were the exception, not the rule. And trails were sure to be found at and about all the beacons⁸ and high boulders anywhere in the region. They were especially numerous at the cemetery, where there were several piles of stones as well as some rather high, wooden crosses. I noted that the animals rarely climbed up a beacon. The footprints clearly indicated that in reaching the top the animals leaped lightly from rock to rock rather than crawling up over the edges of the stones. On November 13 and 14 many trails led especially to the beacons, on which I had set traps for owls; but no weasels were caught in these traps.

On November 16 a fully white female specimen was caught in a fox-trap at Native Point by the Eskimo known as Billy Boy. I was told that weasels were more than usually common in that section of the Island at that time.

During early December I continued to see tracks every day. On December 16 what I believe to have been separate trails were observed on at least twenty ridges. The trails wound about a great deal, often to no apparent purpose, as if the lithe hunters were merely listening for sounds of lemmings under the snow. Now and then, however, the trails led to a burrow in the snow and once I noted tiny bits of frozen blood, or the signs of a brief scuffle, where a capture had been made. The trails in one or two instances followed ptarmigan- or hare-trails for a short way, but I think this was largely a matter of coincidence, for there was little evidence that the weasels had been giving the hares or partridges a long chase.

On December 17 I caught a large, fat,⁹ bob-tailed male in a trap that had been set at the base of a perpendicular five-foot rock-face, just under a dangling chunk of rotten fish. This was the only bob-tailed individual I saw during my stay on the Island. Its tail probably had been cut off in a trap.

During January, weasel-trails were abundant most of the time. I was amused by the statements of my Eskimo friends that all these trails were made by only one, or maybe two animals. I had measured the tracks, of course, so was certain that different individuals were responsible for them; yet the natives continued to assure me that *Teggeuk* wandered very widely while hunting, and that he sometimes had to go ten or twelve miles before he could catch a mouse. I found it useless to argue about the matter, for the Eskimos rightly felt that I did not know much about their country; yet I had some satisfaction in bringing in specimens day after day which I had caught along the very ridges, which were the hunting-ground of that "one" far-ranging *Teggeuk*.

On January 8 I spent a good deal of time following trails. They led along the ridges, as a rule, and the deeper snow-drifts. They zigzagged, looped, and figure-eighted about,

⁸These beacons, which are built up at the entrances of harbors, as a rule, are constructed of small stones to a height of five to eight feet and are frequently called "American Men" in the North Country.

⁹According to Sutton's recollections, this fat was found principally, if not exclusively, in the region of the belly, or in a strip along each side of the belly. According to my experience, the fatty areas in *Mustela cicognani* and *M. novboracensis* from New York are located in the same region of the body.—W. J. Hamilton, Jr.

leading to a lemming-burrow here, to a crevice in the rocks there, or to an open, wind-swept area of gravel or moss. On the southern slope of one of the biggest drifts I found what appeared to be the den of one of the weasels. There was but one entrance. It was about two and one-half inches broad at the mouth, and led almost straight downward for about three feet to the rocks. When I first noticed this burrow I kept quiet for an instant, then began squeaking. Soon I saw down in the blue darkness the pale purple glowing of two eyes. But the weasel could not be lured out. I set three traps here, two at the very entrance of the burrow, and one on a high rock nearby.

On this same date, Jack Ford had to liberate from a fox-trap one of his dogs. Jack told me that about the unfortunate dog, which had, of course, struggled to free itself, was a heavily beaten down ring of weasel-tracks just far enough away from the outermost ring of dog-tracks to be safe. No wonder the tale is sometimes told in the North Country that the weasel will kill a full grown caribou.

On January 9 I caught a female in a trap set below a dangling lemming at the foot of a steep rock. The stomach was empty. The animal was rather fat. I noted that while many weasel-trails led to my fox-traps, the animals were rarely caught in these traps, for the weight of their bodies was not sufficient to break the thin shell of snow that I always placed over the trap.

On January 12 I found another weasel-burrow. It led straight down for about eighteen inches, then shot off abruptly to one side. On the following day I saw the weasel itself near this burrow. It was astonishingly quick in all its movements, and, as it ran, held its tail almost straight up. It flicked its tail jauntily, just as it popped into its den.

On January 15 I revisited the weasel-den found on January 8, and discovered to my surprise that no animal had been caught in any of the traps, but that a new opening to the den had been made about twenty feet from the one previously used. I set more traps at the new entrance and the following day caught a nice male, which was still alive when I found it. This was the only live weasel I saw in a trap. As a rule, I believe, they tire easily, or chill rapidly, and die soon after being caught.

On January 17 I caught a male at the entrance to its burrow among a large pile of rocks not far from a large frozen lake. The stomach of this animal contained no hair; only a thick, blackish substance, perhaps the blood of its prey.

On January 19 I caught another male in a trap set below bait placed in an inaccessible niche above it. I noticed that fresh trails frequently led directly to the traps, where animals had recently been caught, as if the weasels had been attracted by the odor, or by the sounds made by the captured animal.

During January we noted many trails about the buildings at the Post. The animals evidently ranged widely; and they were attracted by the strange odors of the store and of the shed where seal-oil and dog-food were kept.

On January 25 I caught a rather small individual in a trap set several days before at a burrow. About the animal and the trap were innumerable tracks, probably of animals, which had come up to sniff the carcass. All these new tracks were in fresh snow, which had fallen after the weasel had been caught.

On January 26 I noted a round opening into a drift, about which there were a few weasel-tracks. Evidently the animal had been chasing a lemming, had come out of the burrow for a short time, and then had returned to continue the chase. I searched diligently for other signs of this weasel's trail and found none within one hundred yards. This made it evident to me that much of the weasel's winter-hunting is done under-ground in the lemming-burrows.

On January 30 I caught a very large male in a trap which had been set, without bait or covering, simply on the top of the highest pinnacle of one of the rocky ridges, which paralleled the shore of South Bay east of the Post. On the same date I found a den toward which dozens of trails led, and near which there were several urine spots and slender, dark-colored faeces in the snow. I am sure that at least two animals were living at this den. It was not difficult, as a rule, to distinguish the male from the female tracks, for those of the males were much larger.

On February 3 I caught a female in a trap, which had had a lemming suspended above it by a string.

On February 9 I saw innumerable trails, and found myself agreeing with the Eskimos that the little animals are most active when the moon is brightest. On February 13 I followed one trail fully a mile out into the rough ice of the harbor. I did not come to the end of the trail, nor was there much zigzagging about. I think the animal was going to a new hunting-ground across the harbor, seven miles away.

On February 20 several "double" trails were noted, apparently where male and female animals had travelled about together. Whether these trails can be considered as evidence of mating we cannot say. We can affirm, however, that as a rule, weasels do not hunt together.

On February 22 two males were taken from traps not far apart, and no small, supposedly female tracks, were seen anywhere nearby.

On March 1 a male was caught in a trap, which had been set without bait or lure of any sort on a small rock set upon a high boulder. I am sure that traps set in this way would catch a great many weasels on the tundra, for the animals seek out these highest places every night, either to satisfy their curiosity, or to survey their hunting-ground from a vantage point.¹⁰

I was much interested in noting that weasel-trails frequently led up to and about trapped foxes and owls. I am not sure that the fox ever eats the weasel, but I think it very likely that the Snowy Owl does so upon occasion, perhaps frequently. The weasel is resolute, however, and does not hesitate to come up to sniff at his larger foes, when they are caught in a trap. The Husky dogs apparently do not touch the weasel, as a rule, probably because they find the odor of the musk highly offensive. When I threw the skinned bodies of weasels to the hungry dogs they rushed up to get them, but did not eat them with relish and sometimes dropped them or left them for the half-starved, quivering puppies to bolt.

On March 10 the Eskimo, Angoti-Marik, caught a male for me in one of his far inland fox-traps. He told me that in that district he had not seen many weasel-tracks. On March 12 a rather large female was caught in a trap set on the top of a high boulder.

From April 26 to 30 no weasel-tracks were noted on the ice at the edge of the floe near Native Point. Both fox- and lemming-tracks were noted, however, so it is logical to infer that the weasel does not range quite so widely as do these other animals at this time of the year.

No female specimen taken up to this time contained embryos, so it is questionable whether mating had taken place. I did not succeed in capturing a single specimen during May, so am not able to offer any remarks concerning the change of pelage in spring, other than that animals seen during this period of melting snow are parti-colored, as are those of late summer and early fall.

On June 23 I shot a male in full summer-coat. When first seen it was leaping about

¹⁰It is my belief that the eye-sight of the weasel is not very good. When animals look about their hunting-grounds from these high places they probably learn as much from what they smell as from what they see.

on the tundra, looking this way and that, as if searching for a bird's nest. My attention was directed to it, in fact, by the agitated cries of buntings and longspurs. As the weasel jumped about, it wasted a good deal of energy, it appeared to me, for its springings were fully two or three times as high as they needed to be in such more or less aimless wanderings, as those in which the animal was indulging. The gonads of this specimen were much swollen.

On June 27 a small animal, probably a female, and in full summer-pelage, was seen running about among the rocks near the buildings of the Post.

On July 5 the Okomiut boy, Noah, brought me a handsome female specimen, which he had killed with a stone. There were no embryos in this specimen, but the mammae were swollen, so I am certain she was suckling young. On the same date in passing a pile of stones at the base of a ridge, while catching butterflies, I chanced to hear the strange chuckling sounds of a mother weasel at the entrance to her den. When I first saw the little beast, she was peering at me from under a rock not more than three feet away. She was fearless and very curious, and showed her anger by hissing, making cries which might be written "*Chuh, chuh,*" and glaring at me with open mouth. She was so excited that she ran out and touched my foot two or three times. I could hear her young ones calling to her from under the rock, but I could not get to them, so do not know how well developed they were, nor how many there were in the brood.

On this same date Father Thibert saw a family of four young weasels with their mother not far from Seal Point. They all spent most of their time under the rocks, but came out to chuckle at the strange, big animal, which lingered so near, running over his feet and sniffing at his clothing. Father Thibert put a loon's egg down near the entrance to their den, in such a position as would command their attention. All the weasels came out at once to inspect, sniff at, and paw over this new object in their world. They would all dart back in a twinkling, if Father Thibert made the slightest movement.

On July 6 I saw an adult weasel swimming across a small stream. The animal progressed rapidly, in a leaping manner, much as it progressed over ground. Evidently it did not swim "dog-fashion" at all, but by stroking with both front or both hind feet at once.

On July 7 I secured a female from a pile of stones near the Post. I could not, however, find a nest.

On July 10 one of the Eskimos at Munnimunnek Point caught a mother and four well developed young and brought them in stuffed with grass. The tails of the young were short and thinly haired.

On July 14 I saw a large animal, probably a male, among the rocks at the head of South Bay. On the same date Father Thibert presented me with a large male, which had been killed with bow and arrow by one of the Eskimo lads not far from the Mission building; and with fourteen lemmings and four young Snow Buntings which had been found heaped in that one weasel's den. All these creatures bore neat tooth-marks on their necks, or skulls, as evidence of the manner of their slaughter.

On July 27 I watched a family of five young weasels with their mother for some time. They were very pretty and graceful in their movements. So quick were they, that the rocks seemed to be alive with them. A bright-eyed face would peek out here; a winnowing would sound there; a brown, white-fronted form would dart across a little opening; the grasses would quiver and the flowers tremble on their stalks, as a lithe form would creep among them; weasels were everywhere. They hissed, blew, and chuckled at me, yawned in my face, ran after each other with pretty musical cries, and rolled down the rocks in somersaults, biting at dry lichens on the way. Occasionally they would pull themselves through the grass,

as if they enjoyed the sensation of having their bellies scratched, or would lie limp on the rocks peering at me with heads turned to one side, puppy-like.

On August 1 an Eskimo child brought me a large male, which had been killed some time previously in the vicinity of the Ranger River at Cape Low.

On August 5 I saw a small individual, probably a female, not far from the Post.

Annual Cycle of Activities: The change from summer- to winter-pelage accompanies the period of early autumn snow-fall. According to the few specimens collected at this time of the year, the change begins, or at least is first completed, in the region of the body, and is consummated with the head and feet. The tip of the tail, of course, is always black.

By mid-October most of the Southampton Island Weasels are as white as they ever become during the course of the winter. Whether they change their burrows or dens at this time, I cannot say. Probably some animals continue to use the nests they occupied during the summer; other individuals, notably those which migrate into a new region for the winter-hunting, adopt new dens. These are practically always among the rocks along the ridges, and the entrances are usually in the snow, sometimes in deep drifts, through which long entrances have to be dug. These entrance-tunnels, which nearly always reach straight downward to the very place where they lead under, or between the rocks, are about two inches in diameter and are almost round. The animals pop into these burrows with amazing agility. I have never examined the actual winter nest of a weasel, for these were always placed under such large rocks, or in such an inaccessible place, that I could not reach them without blasting, or some other measure, which would unduly have consumed time and labor.

The winter-food of the weasel is almost exclusively lemmings. Since both species of lemmings inhabit the same burrows, as is pointed out in another part of this paper, the weasel probably preys upon both species equally, catching most of them in their burrows under the snow. I have seen signs, which led me to believe that lemmings are sometimes pursued and captured on the snow; but most of the hunting by the weasels is carried on in that endless labyrinth of tunnels deep in the drifts. Weasel-tracks are to be seen everywhere on the snow, to be sure; but these animals are probably seeking a new section of burrows in which to work; they are hardly on the lookout for the chance lemming that wanders from burrow to burrow. Hunting under the snow must indeed be agreeable to the slender weasel, for, while he is thus engaged, he is altogether invisible to all his enemies. Neither the Snowy Owl nor the Arctic Fox can see him. And if he wishes to sleep, he has but to curl up in the warm dry nest of the lemming, the rightful inmates of which he has just slain.

That weasels wander widely in search of a good feeding-ground was evident to me many times during the winter. Not only do individual trails cover much ground, but there are times when notable influxes of weasels occur; an immigration of individuals from farther north, perhaps; or from a section where lemmings are not common. Whether the local population of Southampton weasels is ever augmented by a migration of individuals from Melville Peninsula is unknown to me; I think it hardly likely, unless the weasels definitely follow a migrating lemming horde across the ice-bound stretches of Frozen Strait.

I am of the opinion that weasels practically always eat the flesh of the lemming or other prey that they have caught, and that they do not merely suck the blood. Once or twice I found dead lemmings on the snow which may have been killed and left by weasels; but the lemming remains found in burrows showed that almost the entire carcass had been consumed.¹¹

¹¹It is possible that such "lemming remains" were left, not by a weasel, but by other lemmings, for lemmings are at times cannibalistic.

Mating may continue more or less all through the winter. But it is probably at its height in April and early May. The young probably are not born until the winter-snows have melted away, and the summer-pelage once more resumed. The nest is under a heavy rock, usually in an inaccessible place. The young are fed upon young lemmings, and young birds, especially of those species which nest under rocks, such as the Snow Bunting.

Taxonomic Remarks: *Mustela arctica semplei* differs noticeably in size from *Mustela arctica arctica* of Alaska, the latter animal being nearly a third larger. In coloration, however, the two races differ but little.

The closest affinities of *semplei* appear to be with those of the Greenland form, *Mustela arctica polaris*, rather than with those of the Alaskan animal. Both the Southampton and the Greenland weasels have white upper lips in summer pelage, and if we can judge from the meagre information given us in the original description of *polaris*, there is little difference in size between the two forms, *polaris* being apparently somewhat larger. The description of *polaris* was based upon an unsexed, dried skin (without skull) in summer-pelage. The length of the hind foot of *polaris*, as given in this description, is 38 mm. It is a well-known fact that British mammalogists customarily take this hind-foot measurement to the end of the longest toe and do not include the nail. Allowing for this method of measuring and for the shrinkage that is to be expected in a dried skin, we may properly suppose that the hind foot of *polaris* actually measures about 43 mm. (nail included) in the flesh. In *semplei*, average males (adult) have a hind foot measuring only 39.6 mm.

Other Records: It is a little surprising that so few of the earlier writers mention the weasel among the mammals encountered in this region.

The author of *Appendix II* of Sir John Ross's *Voyage of Discovery* records the weasel from the west side of Baffin's Bay (1819, p. xliii). Lyon (1824, p. 54 and elsewhere) states that weasels were found on the east side of Melville Peninsula during the course of Parry's Second Voyage. James Clark Ross (1835, p. x) mentions the occurrence of the weasel on the shores of Boothia Felix. All of these references are doubtless to *Mustela arctica*, though it is not certain what subspecies is to be found in these places.

Kumlien (1879, p. 53) considered the weasel (supposedly *M. arctica arctica*) rare in the region of Cumberland Sound, saying that it was "even unknown to some of the Eskimos."

Preble (1902, p. 67) lists *Putorius arcticus* Merriam, and gives us several references, but apparently did not actually encounter the species during the course of his expedition.

Low (1906) does not even mention the species.

Hantzsch (1913, pp. 154-155), calling the animal *Putorius cicognanii*, apparently found the weasel very rare in the vicinity of Blacklead Island near Baffin Island. Soper (1928, pp. 31-32) tells us that *Mustela arctica arctica* is "comparatively scarce on Baffin Island."

Mathiassen (1931, p. 27) mentions "ermine" among the terrestrial mammals known to occur on Southampton Island. He says: "Foxes, ermines and lemmings are numerous."

Mr. Ford told me that he had seen many weasels since coming to Southampton Island in 1924, and that he had noted them also on Coats Island.

Genus GULO Starr.

Gulo luscus (Linnæus). WOLVERENE.

Eskimo Name: *Kubbing*, according to Soper (1928, p. 32).

Status: The Wolverine is known to occur, sometimes rather commonly, in the region of Repulse Bay to the northwest of Southampton. Captain John Murray, who caught two Wolverenes in a sort of snow-den at Repulse Bay in about the year 1902, and who is

also well acquainted with Southampton Island, assured me that, though the animal is well known about Repulse Bay it is not found on Southampton, and with this belief Mr. Ford entirely concurred.

Captain Comer, on the other hand, has expressed the belief in a personal letter that Wolverenes do occasionally wander across to Southampton. I am not sure upon what he bases this belief. Judging from what I heard of the animal, while I was on the Island, I am inclined to think that it has never actually been taken, or seen here.

This, then, evidently is a species, which invaded the mainland along the northwest corner of Hudson Bay after the insularity of Southampton was established. In this respect it is like the shrew, the *Oogjewmuk* of the Eskimos. Neither of these animals can be very venturesome, else they should have wandered to the Island on the ice of Frozen Strait or have been carried across on some of the floating cakes long ago. Both these species probably are to be found in the northernmost part of Melville Painsinsula, so latitude and consequent temperature have had very little to do with their distribution hereabouts; and they would surely find Southampton a suitable habitat could they once establish themselves here.

Family CANIDÆ.

Genus VULPES Oken.

Vulpes fulva (Desmarest). RED FOX.

Eskimo Name: Unknown to me.

Status: Soper (1928, p. 33) says: "It is evident that the accidental occurrence of the red fox on Baffin Island is a comparatively common incident." He suggests that a certain fox captured by an Eskimo at Cape Dorset "a few years ago" might have reached Baffin "by way of Southampton island from Keewatin."

While I was at Southampton I heard a good deal of discussion about two foxes, alleged to be "cross" foxes, which had been caught by the Eskimos. I never saw these animals, but Mr. Ford considered them examples of this form, and it may be that they were, indeed, stragglers from the mainland, which had come over on the ice. One of these was caught by an Eskimo (name lost) at Native Point, on January 29, 1928; the other was taken at Duke of York Bay, by Amaulik Audlanat, on February 2, 1928.

Captain Murray told me that during the winter of 1902, the Eskimos reported to him that they had seen a red fox somewhere inland from Cape Low.

Genus ALOPEX Kaup.

3. *Alopex lagopus innuitus* (Merriam). ARCTIC FOX; BLUE FOX.

(Plate IX, fig. 3)

Eskimo Name: The name of the Arctic Fox, as I wrote it down, is *Teregeneuk*. Soper (1928, p. 33) tells us that the name in Baffin Island is "*Terriginiak*; *Terrienniak*, according to Hantzsch." The similarity of these words to that for the weasel, *Teggeuk*, is marked. The etymology of the words is not known to me.

Status: The Arctic Fox is found all over Southampton Island. It is, apparently, equally common in the high eastern part and in the flat country about Capes Low and Kendall. It is not always common, to be sure, for it is subject to cycles of abundance and rarity. Since the establishment of the Hudson's Bay Company Post at Coral Harbor, in 1924, foxes have been fairly numerous every year, and decidedly abundant during some years, so

that Southampton may fairly be regarded as a region in which conditions on the whole are favorable to the maintenance of a large population of foxes. The abundance of foxes is probably in large measure dependent upon the supply of lemmings. Since lemmings are widely distributed over the Island and are usually found in considerable numbers, foxes also are usually found.

The Blue Fox, a color-phase of the present species, is found regularly, though never abundantly, on Southampton Island. According to the records of the Hudson's Bay Company and in the opinion of Mr. Sam G. Ford, about one out of every one hundred foxes taken on Southampton is blue. Apparently the blue phase is found somewhat more commonly on Baffin Island, where, at Pangnirutung fiord, according to Soper (*ref. cit.*) "the blue variety was said to constitute about five per cent of the total catch." This writer also maintains (*Ibid.*, p. 36) that "the proportion of blue foxes increases northward and, it is said, in northern Ellesmere land and Greenland the blue variety predominates."

Records: During the late summer of 1929, I did not see any foxes about the Post at the head of South Bay. The animals were common thereabouts, however, and I sometimes saw tracks, or noted the feathers of ducks which evidently had been caught and eaten. On August 27 we saw one in brown pelage, which evidently had not yet begun to lose its summer coat to any great extent. It was running along the beach at Four Rivers. I was impressed, as I watched the animal, with the straightness and stiffness of the tail. Its attitude in running was not particularly graceful.

On the following day we had one of the most harrowing experiences of my sojourn on the Island. In making our way in to a harboring-place for the night our propeller was damaged so badly that it was useless. My companions, who somehow managed to keep from getting seasick, succeeded in dragging our motor-boat into calm water by use of the anchor. When I was finally able to stand upright and to help to some extent with the boat-hook, one of the first sounds I heard from the shore nearby was the somewhat derisive barking of a fox. It was a strange sound, small, thin, rather doglike, and somewhat peevish. When we finally reached a place where it was safe to spend the night we roused the curiosity of the foxes of the neighborhood by lighting our lanterns and we heard the whining and barking of several animals, perhaps a family of young, all along the shore.

On September 2 at Cape Low, Mr. Ford found the tail of a fox along the shore. The animal had been in summer pelage when killed; we could not determine the cause of its death. Possibly it had somehow lost its tail and had not been killed. On September 3 Mr. Ford saw one in very ragged summer pelage at Cape Low. The animal was unsuspicious and curious.

We continued to see tracks of foxes in the sand or mud everywhere along the southern shore of the Island. The animals must have been especially common at Four Rivers and at Leyson Point. On September 26 I saw the tracks of a large and a very small fox running parallel to each other along the beach, near the mouth of the Anderson River. On October 2 the remains of a parti-colored Rock Ptarmigan were found by me. I feel sure it had been killed by a fox.

With the coming of the snow, and the consequent appearance of fox-trails everywhere, foxes suddenly seemed to become abundant about the head of South Bay. On October 4 I noted the trails of at least six, some of which I followed for a considerable distance. One of these led finally to a sheltered spot near a partly frozen lake where the body of an Oldsquaw duck evidently had been cached weeks before. Another led through swampy country out to a sort of burrow, about which were scattered egg-shells; probably another cache. I

noted that certain of the pale yellow urine-spots, which were to be seen here and there, especially on the high places along the trails, were tinged with reddish blood-stains. At one place I noted that two animals had been frisking in the snow. On the same date Keetlapik saw the trail of a fox, which evidently was dragging a trap about with it.

During early October, hundreds of fox-trails were to be seen. On October 9 I found the remains of an eider-egg, which had been dug up from the snow and eaten. On October 17 I followed several trails, noted places where the animals had dug in the drifts for lemmings, and observed that at any such place where considerable digging had been carried on, there were also many signs of urine. I spent a good deal of time trying to find a burrow or sleeping quarters, but had no success. On October 30 I observed an interesting series of marks in the snow, where a fox had evidently tried to catch a lemming by pouncing upon it through the thin snow above its burrow. The fox had apparently been unsuccessful for a time; but after one attempt it had listened carefully; then made another attempt; and finally had pinned the mouse down; bitten it, and pulled it out from the snow with its paws. In making the attack the fox had made high, clean leaps, and had not run helter-skelter along the burrow.

On October 31 Jack Ford told me that on their *komatik*-trip to Prairie Point they had seen many fox-tracks; had heard one barking at night; had watched one, while they were building their igloo; and had had an exciting time with the dogs, while they were chasing one on the harbor-ice. The dogs might have caught up with the fox, had it not suddenly changed its course and run down wind. Jack said that neither of the animals he had seen were yet in full winter-pelage, but that they were both predominantly white.

On November 1 Eskimos from the region of Cape Low brought two fox-skins in to the Post to trade. Neither of these animals was in full winter-pelage, and the spotting and blotching of gray-brown made the skins practically worthless. The gray summer-fur was to be seen principally in the region of the neck, shoulders, and back.

On November 13 three skins were brought in for trade, and all of these were perfectly white. Mr. Ford told me that he regarded this as a sign of early cold weather, for he had many times seen fox-skins taken as late as December, which were not in complete winter-pelage. On November 14, three more skins, all in complete winter-pelage, were brought in. On November 15 Jack Ford caught one not far from the Post, a young male, in pure white pelage. It weighed seven and one-half pounds. The eyes were greenish or grayish yellow, not of a particularly handsome shade in the dead animal. On November 18 Jack caught an adult female, a pure white individual, quite fat, weighing five and one-half pounds. At about this time we saw a great many trails all about the head of South Bay.

On November 19 I found many diggings in deep drifts. Here the foxes had tunnelled their way directly to lemming-nests in the heart of the drifts. After examining a number of these diggings I decided that the foxes must listen for some time to the comings and goings of the mice; decide upon the precise location of the nest before even beginning their digging; then make their way rapidly downward at an angle of about forty-five degrees. I take it that foxes, in cases of this sort, catch principally the young in the nest. I never witnessed such captures, so do not know whether the mother lemmings permit themselves to be caught while guarding their young, or not. Evidently they do not carry their young away as some mammals are known to do. Many of the diggings I examined were four or five feet long, and they were as a rule just large enough for the body of the fox. The grass of the lemming-nests was usually left more or less in place; sometimes it was strewn roughly about. Spots of urine were usually to be seen nearby and often a single small, black scat was to be found

on the top of the drift to one side of the burrow. Occasionally there were shallow diggings here and there, where the fox had begun to sink a shaft to the nest, but had abandoned the effort.

A male fox caught in one of Amaulik Audlanat's traps on November 22 was in perfect winter-pelage; a female caught by Jack Ford on November 27, however, had small tufts of gray fur yet remaining in the region of the rump. On the following day, Jack Ford caught another female, a very small, light one, weighing only a little more than three pounds.

On December 2 I tried to photograph a fox, which had been caught in one of Amaulik's traps at the head of South Bay. The eyes were clear golden-brown, and the facial expression was that of a creature somewhat dazed by the light. When we came up, it growled in a high, thin voice, and gave several strange, almost bird-like, chirps and musical sounds. One specimen, caught by Amaulik Audlanat on December 2, had small tufts of summer-fur remaining on the flanks. By December 3, about a hundred pelts had been brought in to the Post for trade and Mr. Ford told me that the overwhelming majority of these were in prime condition.

Early in the winter I began a study of trapping methods, and with one or two lessons learned to set a fox-trap. It is my opinion that the Arctic Fox is not a difficult animal to trap. The Eskimos probably could procure many more than they do, if they kept more traps out, and if they visited the trap-line more regularly and more frequently.

I remember distinctly my first lesson in fox-trapping. Sam Ford and I were out, not far from Seal Point. We watched the general trends of the various trails and finally decided that a certain low ridge near a lake would be a good place for a trap. Sam took his *pana* or snow-knife out of his trapping-bag, and cut from a drift a chunk of snow about two feet square and eight or ten inches thick. He then brought out a steel trap, through the ring of the chain of which he stuck a piece of wood about two feet long. He stamped the snow down firmly over this piece of wood, then placed a medium-sized, round stone over it. This, I could see, would hold the trap and keep the animal from escaping, for the snow would freeze very hard in a short time. Next he placed the block of snow close against the stone, with the chain of the trap between the stone and the snow-block. Then he hollowed out an area in the top of the snow-block into which the set trap would fit, set and placed the trap, scattered a few shavings of rotten fish about, then placed *over the trap* a very thin slice of firm snow, which he scraped delicately down until it was possible actually almost to see the trap through it. As I watched the setting of this trap I could see that it would be an easy matter indeed for a very hungry or curious fox to put his foot into the trap through that paper-thin shell of snow.

Nevertheless it was some time before I caught a fox. Sometimes the wind was so savage that the plate of thin snow was soon worn away and the trap drifted under completely. Sometimes the fox sprang the trap or clawed away the bait without being caught. Sometimes hares or lemmings blundered into them in the course of their wanderings about the tundra.

Eventually I found that, when foxes are really common, traps may be set almost anywhere; but that, if they are scarce, it is sometimes almost impossible to lure them into danger.

The Eskimos catch foxes in many ways. Formerly they made big traps by piling stones up in the shape of a big, inverted cone. The fox, lured by bait placed on the floor, would jump into such an enclosure and then be unable to jump out. Barrels with the lid swung on a pivot are frequently used with great success. Snares are sometimes employed. The Eskimos even catch the animals out in the open, surprising them as they dig for lemmings in the deep drifts.

On December 12 I dissolved a few fox-droppings found near one of my traps and found among the lemming-remains the summer feathers of a Red-backed Sandpiper. This bird doubtless had been cached sometime during the nesting-season.

On December 16 I caught a handsome male fox weighing almost eight pounds, which had a little gray summer-hair in the region of the ears and on the flanks. On December 20 Jack Ford caught a very large, very fat male weighing nine pounds and nine ounces. The stomach was empty. By the end of December many fox-skins were being brought in for trade almost every day, and I was kept busy cleaning skulls. By December 31 over two hundred skins had been brought in for trade; and most of these were, of course, prime skins.

On about January 2, 1930, John Bull found hairs of a Blue Fox in a trap at Leyson Point.

On January 13 I noted that a fox had come up to one of my traps, evidently sniffed about, and then, utterly disregarding the bait, had clawed at a patch of frozen urine on the snow. During January I saw many digging all about the Post. Most of the trails indicated that the animals usually hunted singly; but now and then two parallel trails were observed.

On January 20 one of the Eskimos at Native Point saw a Blue Fox running along the edge of the salt-water ice.

During January and February there were not many foxes about the head of South Bay. Thereafter they seemed to become abundant again.

The Eskimos constantly complained of the damage done by wolves to the foxes especially in the Cape Low region. Muckik reported once that almost half of the foxes he had trapped were destroyed by wolves. On February 8 Jack Ford had the interesting experience of seeing a Snowy Owl attacking a trapped fox. The great bird swooped about, buffeted the fox, slashing its face and head with its claws. By the time Jack got to the fox it was all but dead. A great many owls are caught each season in the fox-traps; not so much, I believe, because the owls attempt to steal the bait, as because they like to perch on the blocks of snow whence they can look out over their hunting grounds.

In mid-February I noted several fox-trails, which appeared to me to be of animals going about in pairs or following each other. At this time I found that cheese was quite as good bait as rotten fish. On February 21 I was surprised to note that there was a touch of gray-brown summer-fur on each flank of a female specimen caught at the head of the Bay. The under hair of the tail, also, was definitely dusky. It has occurred to me that this animal might have been partly of the "blue" phase. The animal weighed five pounds.

On February 28 a handsome Blue Fox was caught at Darkness Lake. I examined this animal carefully. The general color was smoky gray of a very handsome shade, but the feet pads were white and there was a sprinkling of white on the head and tail. Mr. Ford told me, as we examined this beautiful pelt, that prime Blue Foxes were taken usually only at this time of the year; for later in the spring the smoky color was usually so badly faded by the glare of the sun that the pelts were all but valueless.

I was surprised on March 1 to learn that one of the best of the Eskimo trappers, Muckik, was using perfume as bait. A new use for *Florida Water*.

I caught two specimens on March 6, a large male and a slender female, the former with a large patch on the flank stained a dull yellow which I could not remove with water, carbon-tetrachloride, gasoline, or Plaster of Paris. The "vellum," or inside of the skin of this same specimen was turning blackish in the region of the nose and the feet. At about this time most of the trails were to be seen in the flat meadow-country, and not so frequently along the ridges.

On March 13 a female in changing pelage was captured. The inside of the skin of the

ears, nose, face, and legs was very dark; the external appearance of the animal was yet that of the winter, but the under fur of the legs was decidedly gray. Two animals caught by Scotch Tom at Prairie Point on March 15, were also changing color.

On March 16 Jack Ford saw many trails at the head of South Bay, found a fox in one of his traps, saw three running about over the drifts, heard one in a burrow *under* the snow, and had the decidedly interesting experience of startling one from a nap. The fox had lain down in the warm sun, and the fur of its side had frozen so fast to the snow that at first it could not rise. Eventually it had been able to get away with chunks of snow clinging to its back and sides. On the same date, Pialak caught one rather faded blue, and three prime white foxes.

On March 20 I caught a female weighing about six pounds. Spots on her flanks and the backs of her ears were decidedly grayish in color. I think this animal had not mated; I could find no embryos in the uterus.

On March 21 Muckik and one of his fellow hunters brought in forty-seven foxes, one of which was a miserably faded blue. Included in the lot was one peculiarly *maned* specimen, with a ruff of unusually long hair about the neck and in the region of the shoulders. Mr. Ford told me that he had seen a few such individuals before, and that he did not know how to account for such an aberration.

During latter March there must have been a sort of invasion of foxes all through the region of the head of South Bay, for we actually saw hundreds of trails wherever we went, many of them along the edge of the salt-water ice. On March 26 Amaulik Audlanat saw a fox running across the tundra with a trap hanging to its right front foot.

On March 29 Sheeloo and Tapatai found the remains of a blue fox in one of their traps. The carcass had been torn to pieces by the wolves.

On April 1 I caught a small, rather mangy female. There was an old scar on the neck. The face and the top of the head had started to change color and the hair, especially that about the mouth and ears was alive with small black mites, some of which I preserved. On the same date, Amaulik Audlanat caught a male, the nose and face of which was decidedly dark in color. Mr. Ford told me that he expected all the animals to be in spotted pelage from that date on.

On April 4 Jack Ford made a special trip to some burrows he knew to be inhabited by foxes along the Ford's Rivers. Here, on relatively high ground along the edge of the shut-in stream, he found nine entrances to long burrows all in one comparatively restricted area. He told me there were probably a good many more such burrows sealed shut with the snow.

On April 8 I caught a large and handsome male animal in perfect winter-pelage. This and several other individuals I liberated in the hope of getting specimens which would show more of the change of pelage in the spring. The foot had scarcely been injured by the trap. As the animal loped away I noted again that the tail was held very stiffly, straight out, almost as if it were incapable of being bent.

On April 12 I found one large drift, into which at least ten full burrows had been dug after lemmings. On April 16 Pialak caught a blue fox along the edge of the salt-water ice at Munnimunnek Point.

By May most of the Eskimos had taken up their fox-traps. At about this time I was told that a good many of the female animals were gravid, but in spite of my oft repeated requests for specimens, I did not get any for preservation. I was told that as a rule there were many young in a brood. Some females had had as few as seven or eight embryos, but

most of them had from eleven to thirteen, and Mr. Ford told me that he had counted sixteen young in one female taken in late May.

From May 7 to 15 I noted many fox-trails at the edge of the floe many miles from land, in the region of Native Point and Bear Island, and decided that the animals must be wandering, either in search for new hunting-grounds for the lemmings, which occasionally run about on the surface of the snow, or for sea-weed that had been caught in the ice. These trails frequently led along the very edge of the ice.

On May 19 Tommy Bruce and I had a most interesting experience with a fox. We were crossing a wide plain just west of the cliff at Itiujuk when the dogs scented a fox. We saw the dainty animal in the far distance, but it did not occur to me that we could possibly overtake it. After the dogs had run for about fifteen minutes at a considerable speed they suddenly stopped, and strained their heads forward in an attitude that told us at once they had scented something. We got off the *komatik*, ran forward, and there in a burrow, scarcely more than three feet under the snow, its golden eyes glowing, was a fox. We caught it without difficulty and Tommy saved its skin. There was a good deal of dark fur all about the face and on the feet. The animal had probably been digging for lemmings. The inside of the skin was darkly shaded all over in bilaterally symmetrical blotches, cloudings, and spots. On May 22 Tommy and I saw another one running in a zigzag course more or less up-wind, over the open meadow.

From May 27 to 29 the tracks of a few animals were seen in the region of the Bear Island floe.

On June 5 many tracks were seen in the snow in all the region northwest of the Post. By this time the snow was disappearing rapidly. It was surprising to me that in spite of all the trapping that had been carried on during the winter months, the animals should continue to be so common all about the head of South Bay.

I found on June 11 a fox-den about five miles northwest of the Post in a sort of grassy upland meadow between two low ridges. One of the foxes, probably the male, attracted me to this den with its barking. The cry made by the animal was not a *yip* nor yet a bark; it was more nearly a *squawk*, a loud, harsh, rather drawled cry, very noticeable at close range and with a wild, defiant effect. The fox was not very afraid of me. It sat among the high grass and squawked at me until I was very close to it. The face and neck, as well as spots all over its body, were brownish, but on the whole it was white. When I pressed it too closely it ran into one of its burrows. I could hear it continuing its squawking from inside. All about the burrows (there were many entrances) were the wing-feathers of ptarmigans, the feathers of small birds, and some bones of what I took to be an Arctic Hare. These burrows had been dug in rather a turfy place. Much tall grass grew all about.

On June 13 Muckik found a burrow with many young, which made a considerable outcry as he came up. He did not see the young, but thought there must have been eight or ten in the burrow. On this date Jack Ford and Santiana saw several at the head of South Bay, all of them parti-colored, some more brown than white.

I saw on July 1 the first entirely brown animal of the season. It was carrying prey of some sort in its mouth. I again on July 14 saw a brown animal, which was, I think, hunting. It was vociferously pursued by a pair of Long-tailed Jaegers.

On July 27 I noted extensive diggings in the moss and turf, where foxes apparently had been hunting for lemmings.

From the above data it appears that while most foxes have become largely white by mid-

October, many of them yet retain traces of the summer-pelage even as late as January, and that the summer-pelage is again attained during the following June, or July.

In all the many hundreds of foxes taken on Southampton, which I personally examined, I saw not one with more than a slight wisp of black or brownish on the end of the tail; and as a rule this dark area was reduced to a few blackish hairs.

Annual Cycle of Activities: The winter-food of the Arctic Fox is, as a rule, lemmings. A few ptarmigans doubtless are caught, and an occasional hare. If lemmings are not to be found, however, the foxes usually move out of the country and continue their roving until they find a supply large enough to subsist upon.

Mating probably begins in March or April and is consummated before summer. The young number from six to sixteen. The young are born frequently before the summer-pelage of the parents is complete.

During summer the foxes have little trouble in capturing lemmings, and they doubtless occasionally capture small birds, especially young shore-birds and ducks, which they encounter in the course of their wanderings. They are especially fond of eggs, of course, and are among the principal natural enemies of the ground-nesting birds. Some of the food they catch at this season they cache for future consumption.

Foxes are scavengers. The Eskimos told me that foxes often followed the *komatiks* of the caribou-hunters and hung about like jackals until the "deer" had been killed and skinned, waiting for a chance to rush in to lick up the remains. Sometimes they join the Polar Bears in gorging upon whale or walrus carcasses, which have been cast up along the shore, and they may become very foul and greasy from their gluttonous feeding at such times. They are very curious, as are other members of this family, and frequently are attracted to the Post by the odors which issue from the oil-shed, the store, or the Chief Trader's dwelling.

The Eskimos generally do not use the pelt of the fox to any great extent, though they recognize it as a most important item of trade. They tell stories about the wiles and cleverness of *Terregeneuk*, sometimes imputing the same keen wit and resourcefulness as we have to our Reynard; even though the Arctic Fox appears on the whole to be rather a stupid animal in comparison with the Red Fox.

Taxonomic Remarks: A series of eight skins with skulls and a great many separate skulls were obtained and have been critically examined.

Measurements. The average measurements of three adult males (measured to the end of the hair on the tail) are as follows: total length, 893; tail, 371; and hind foot, 148. The average measurements for four adult females, measured as above, are: total length, 835.5; tail, 328; hind foot, 134. These averages are found to be somewhat smaller than Stone (1900, p. 46) gives for Point Barrow specimens, from the type-locality. Three of his adult males, ostensibly measured only to the tip of the tail vertebrae, are: total length, 965; tail, 377; hind foot, 155. The averages for two Point Barrow females, both adult, are: total length, 925; tail, 369; hind foot, 150.5. The difference in size would be even more marked (15-20 per cent more) if it could be ascertained that the collector took measurements only to the end of the tail vertebrae.

Neither series is large enough to determine satisfactorily whether this apparent difference in size is constant. A great many more specimens must be procured and assembled before the Genus *Alopex* can be seriously studied with the intention of settling the taxonomic status of this polar form.

The average weight of three adult males from Southampton is 8 lbs. 15 oz., while two apparently normal adult females weigh 5 lbs. 14 oz. and 5 lbs. 15 oz. respectively.

The usual sexual differences (principally that of size) that are characteristic of foxes in general, are not very well pronounced in *Alopex*. In adult animals, the skull of the male has a tendency to have a more pronounced occipital ridge than females of the same age, but there appears to be but slight difference in the size of the upper first molar or of the carnassial teeth of either jaw. In one large male, the upper carnassial on the cingulum measures 13 mm.; in a small female the same tooth, measured similarly is 12.5 mm. The transverse diameter from the notch on the outer side of the first molar in a large male measures 10 mm.; in a small female it is slightly smaller: 9.7 mm.

All the specimens of the series are in the winter-pelage. This pelage is white throughout, with the exception of the black nose pad and a few black hairs at the end of the tail; but the color produced by these hairs is not pronounced enough, even where they number fifty or more, to be obvious on a live animal. While we find no reference in literature to these scattered black hairs in the tail, the character is probably not pronounced enough to be of any great taxonomic value, for it varies considerably in different individuals.

Cranial Measurements of adult *Alopex lagopus innuitus* from Southampton Island.

MALES

Carnegie Museum No.	Greatest Length	Basal Length	Palatal Length	Zygom. Brdth.	Interorb. Breadth	Brdth. across Postor. Process	Last Molar to For. Magn.
6610	129	115.5	61	68.5	28	32.5	51.5
6698	124	109	59	66	26	32.5	50
6700	129.5	116	61	66	27.5	33.5	54.5
6707	123.5	112	59.5	63.5	28	32.5	51
6716	123	111.5	57	65	26.5	31.5	51.5
6719	124	109.5	58	66.5	27.5	33.5	51
6704	127	114	62.5	67	29	34.5	52
6721	124	110	58	64	27	31.5	49
6742	123	108	58	63	25.5	31.5	51.5
6746	128	113	60	66.5	27.5	33.5	52
6749	133	116	63	69	27.5	33	53
6771	126	112	59	66.5	27	33	52
6785	122	109.5	57.5	67	27	32	50
6792	129	115	60	69	29	35	54
Average	125.3	112.2	59.7	66.6	27.8	32.8	51.6

FEMALES

6652	123.5	109	58.5	63	26	32	50
6706	119	106	58	62	26	29	49
6709	117.5	104	56	64	26.5	32.5	48
6713subadult.	113	99	54	63	24.5	29.5	44.5
6714	113	101	55	59.5	25	31	45
6736	125	110	59	67	26.5	32.5	51
6750	118	103.5	58	62	25	30	47
6752	120	106	56	64.5	26	31	49
6759	120	107.5	57	65	25	31	50.5
6767	119.5	108	58	62	26	30	48.5
6769	120	106	56.5	61.5	24.5	29.5	48.5
6772	122.5	110	59.5	64	25	29.5	50.5
6773	122	110	59	62.5	27.5	35.5	51
6776	121	108.5	58	62.5	26	31.5	50.5
6779	112	98.5	54.5	62	23.5	30	46
6783	119	104	57.5	62.5	26	33.5	48
Average	119	105.3	57.1	63	25	31.1	48.4

Other Records: According to Sabine (1823, *Appendix*, p. 658) this fox is to be found principally along the seacoast and breeds on the west coast of Hudson Bay as far south as the vicinity of York Factory.

Lyon (1824, p. 46) records the species from Duke of York Bay.

Richardson (1829, p. 89) describes what must have been a blue fox, which was killed December 16, on Winter Island, near Melville Peninsula.

Pebble (1902, pp. 62 and 63) says: "The Continental Arctic Fox occurs throughout northern Keewatin and the adjacent islands of the Arctic Sea." He gives us an extended discussion of the species, as he found it along the west coast of Hudson Bay.

Low (1906, pp. 151-152) gives us a brief discussion of fox-hunting and trapping among the Eskimos.

Comer (1910, p. 86) says: "Wolves are not numerous [on Southampton Island], and, of late, the same is true of the arctic fox."

Munn (1919, p. 54) tells us that foxes were scarce in 1917 on Southampton, but "plentiful in 1918."

Allen and Copeland (1924, p. 7) state that forty skulls were collected by the MacMillan expedition in 1921-22 at Cape Dorset and Bowdoin Harbor, Baffin Island, and elsewhere.

Soper (1928, pp. 33-36) gives us an extended discussion of the Arctic Fox. He says that "periodically [it] is comparatively abundant on Baffin Island."

Mathiassen (1931, p. 27) lists the "fox" among the "terrestrial mammals" of Southampton, stating further that "foxes, ermines and lemmings are numerous."

Genus CANIS Linnæus.

4. *Canis tundraurum* Miller. BARREN GROUNDS WOLF.

Eskimo Name: The name given this animal by the Baffin Island Eskimos according to Soper (1928, p. 37) is *Amarok*. The Southampton Eskimos use a word differing from this, being closer to *Amahghuk*. I do not know the etymology of the words.

Status: In most parts of Southampton Island the Barren Grounds Wolf was formerly a rather common animal. Of late years, however, it has become rare, especially in the southern part, along the shores of South Bay. Its present range is apparently more or less determined by the range of the caribou, and these large animals are to be found principally in the wild, little known parts of the Island east of Duke of York Bay, along the shore of Fox Channel, and along the northwestern coast north of Cape Kendall.

There is a current belief among the Eskimos that some of the wolves of Southampton are merely Husky dogs gone wild. I recall a story which lends color to this belief. One of the Eskimos once caught a young wolf in a trap somewhere in the Cape Low region. The animal was so tractable that the Eskimo decided to put harness on it and let it help pull the *komatik*. The wolf did not greatly object to the harness, and after running with the dogs for a few miles began to understand what was expected of it, and assumed its part of the duties of drawing the sledge.¹²

As has been stated above, the range of the wolf is more or less determined by that of the caribou. The reason for this, of course, is that the wolf preys almost altogether on the caribou. The wolf apparently finds it difficult to subsist on a fare of smaller animals such

¹²Many of the stories of the Eskimos are, of course, only fables. When I questioned Sam Ford about the above story, however, he told me that one of the Eskimos had once actually made a wolf a member of his dog-team and that the animal was one of the most trusted of the team. Mr. Ford himself believes that some of the Southampton wolves may be feral Husky dogs.

as hares, and since there are no musk-oxen anywhere about the Island, the caribou are practically the sole item of food.

Records: During the late summer and early fall of 1929 we heard occasional reports of wolves from the Eskimos, especially from the region northeast of Native Point. The animals were nowhere common, however. My first experience with the species was on the trip to Cape Low, when, in late August, I saw tracks of the animals on the sand and mud along the margins of some small rivers. The tracks were large and broad, larger it seems to me than most dog-tracks.

On November 15 word came to us that Kaligalik, one of the Eskimos who had been trapping somewhere between the Post and Cape Low, had caught a young wolf in one of his fox-traps. Mr. Ford saw the animal and described it to me as "almost white." He went on to explain to me that no full-grown wolf would ever have been caught in that manner in a fox-trap, for the old animals are too wary. On November 30 two more wolves were brought in from the region of Cape Low, where the animals were a considerable nuisance, because of their following the trap-lines and eating the captured foxes. I saw the skins of both these animals. They were big and shaggy and were indeed, very white in their general color-tones. It struck me, as I examined the feet of the animals, that they must be larger than any Husky dog on the Island. The Eskimos saved the skull of one of these animals for me, but the dogs got it and chewed it up so badly that it had been thrown away.

On December 1 we saw a wolf-track in the flat country just west of East Bay. The animal was apparently ranging over the country by itself. It apparently was not following any herd of caribou. On the following day far in the distance, we actually saw a wolf. I shall never forget the majestic creature's behavior. The whole scene was so wild—the rough horizon-line, the steaming open waters of East Bay, the low-hanging sun, the desolateness of willow-twig, protruding bit of rock, wind-swept patch of gravel—and the hoary wolf, turning to look at us, judging his distance from us, then loping away, off into country the white man knows but vaguely, and perchance will never know but vaguely.

Mr. Ford told me that the wolves were as a rule rare in the southern part of the Island until the fall fox-trapping began. As soon as a few trap-lines have been established, however, a few wolves wander in from the north and more or less establish themselves for the winter, getting their living by making the rounds of the traps, stealing the bait in the cleverest manner, and destroying the foxes or the owls which have been caught. During December, hardly an Eskimo came in, who did not bring with him tales of the wolves, which had been eating his foxes; and these tales were full of comments upon the remarkable cunning of the wolf. Traps set in the most ingenious way failed to catch them. One man had set many traps about a well baited fox-trap and the wolf had stolen the bait, making his way off from the trap by putting his feet in the prints he had made coming in. In this part of the North Country it is the wolf, not the fox, apparently, that is the symbol of cunning.¹³

On December 12 I saw a wolf-track about three miles from the Post. The trail led directly across the open country, to one or two of my fox-traps, and finally off toward the distant Itiujuaik. During the following few days I saw the trail of the same animal several times. The wolf sprung several of my traps, but apparently did so deliberately, and in the traps I found not a single hair of the clever beast.

¹³In many of the Eskimo tales, however, the fox gets the better of the clever wolf, reminding us thus of the qualities attributed to the famous Reynard of English literature. One such tale has to do with a fox who told the wolf to catch himself a fish by hanging his tail over the edge of the ice in the water. The wolf lost his tail in trying to catch fish in this way, then upon finding the fox who had caused him this loss, was further led astray by the lying of the fox.

On December 17 Muckik caught a large adult wolf in a single-spring trap near East Bay, but the animal gnawed at the spring, got a good grip with his molars apparently, and freed himself without leaving part of his foot. Muckik told us the story of this wolf with a very dramatic expression on his face. The Eskimos have come to expect such behavior by the wolves, and actually seem to be a little disappointed when a wolf fails to live up to its reputation.

On January 11 the Eskimo, Kaliquilik, surprised us all by reporting that he had found a *dead* wolf along the shore not far from Munnimunnek Point. He told us that there was no evidence that the animal had been trapped or shot, or that it had starved; nor was it a very old animal. None of us could explain the death of an animal apparently in such good condition. It may have been poisoned. Mr. Ford told me that other wolves had been found dead, and that no one had been able to explain the matter satisfactorily. The foxes had torn the carcass of the animal up so badly that it had not been brought in for me.

On January 18 Muckik and Kooshooak told us of the trouble they had been having in the region of Seahorse Point because of the wolves. Fox after fox had been destroyed and eaten, and they had not been able to catch or even to see any of the vandals.

On February 24 Sam Ford followed a wolf-trail which he encountered at Seal Point. The trail led up to one of his fox-traps. There the animal had pawed about carefully, taken the bait, and left without even springing the trap. Sam told us that the animal's footprints were broader than his hand. On the following day, Tapatai told us of a wolf that had dug a tunnel under the snow and come up under one of his traps to steal the bait.

On March 25 I found at one of my traps evidence of irregular happening of some sort. A hare evidently had been caught in the trap, then, while still alive, had been attacked by some large animal, dragged off for some distance while still kicking (there was blood scattered all about on the snow) and eaten, and the spring of the trap had actually been broken. Sam Ford told me immediately the animal could have been none other than a wolf.

During latter March Amaulik Audlanat made a trip through the region of Koodlootok River and Salmon Pond (Darkness Lake) and reported to me that he saw very few wolf-tracks anywhere. Shookalook, however, saw many tracks in the region north of Cape Kendall, while he was there hunting caribou.

During latter March the Eskimo, Kavavou (a man I do not seem to remember) got a wolf with what was known as a *gun-set*. The Eskimo made several false, dummy traps along a ridge. He then placed the meat bait at another place and set a loaded, cocked rifle with string attached to the trigger in such a way that when the wolf came to the meat it was shot in the head. Sam Ford told me that the Eskimos had found this the most successful method, on the whole, of catching wolves.

In late April Tommy Bruce killed a female wolf with three large embryos *in utero* almost ready to be born. When we learned of this, Amaulik Audlanat told me he had found one wolf-den since his coming to Southampton, a large fissure under the rocks at the high mountain northwest of the Post named Mt. Angoti-Marik¹⁴ by Mathiassen.

The Eskimos told me that wolves sometimes have as many as four young in a litter; that they usually hunt caribou in packs, but that in visiting fox-traps they often roam about singly; and that during recent years they have become decidedly less common than formerly.

¹⁴Mathiassen named this mountain, which did not have a very noticeable peak, after the Eskimo, Angoti-Marik, whose better known name was "Scotch Tom." I was not able to make a trip to this mountain, but I made one trip toward its base and found the interior country to be very wild.

Annual Cycle of Activities: I am not in a position to say whether the Southampton Island wolf varies in color with the seasons. The only specimens I saw were of a creamy or pale buffy white color generally speaking; some of the longer hairs tipped with grayish and whitish, giving some areas of the body a frosted appearance. I never saw nor heard of a black animal, such as is sometimes mentioned in stories of the North Country, and to which Soper (1928, p. 38) alludes.

Wolves usually hunt in packs, when they are chasing caribou, their principal food, but they go about singly when they are robbing the Eskimos' fox-traps. They never have been known to attack the Eskimos, so far as I was able to learn. Their craftiness and cunning have made them famous.

They give birth to their young probably in late April or in May. From three to five¹⁵ young compose a brood. The den is situated in a sheltered place, usually along a ridge, among huge boulders, and often a considerable way inland.

Other Records: Not many references to the wolf are to be found among the writings of the earlier explorers in this region. Neither Hudson nor Prickett mentions the species. In Foxe's account of Button's voyage (1894, p. 189) in 1612, brief mention of "Wolves" is made. The animals must have been seen on Mansel Island. Preble (1902, p. 62) says: "The Barren Ground wolf has been recorded by the different Arctic expeditions from various points in northern Keewatin." This statement is doubtless correct; it is therefore the more surprising, perhaps, that such a careful observer as Lyon (1824, 1825) apparently did not encounter the species on or near Southampton.

Kumlien (1879, p. 52) tells us that wolves were seen, especially during winter, about Cumberland Sound, Baffin Island.

Preble (1902, pp. 61-62) saw several wolves in the vicinity of his camp twenty-five miles south of Cape Eskimo. Low (1906) does not mention the species. Soper (1928, pp. 37-39) says: "The Barren-ground wolf occurs more or less commonly throughout Baffin Island, but according to the writer's experience is not, as has been stated, abundant."

Mathiassen (1931, p. 27) says: "There are extremely large numbers of wolves in the caribou district, where they roam about, singly or in packs of ten to twenty and are a source of great embarrassment to the Eskimos; it not infrequently happened that the younger men returned from caribou hunting, as they dared not proceed on account of the boldness of the wolves."

Captain Murray told me that there were many wolves in the region of Cape Low during the winter of 1902. Mr. Ford told me that wolves had been more or less abundant on both Southampton and Coats Islands since his coming to this region.

Family FELIDÆ.

Genus LYNX Kerr.

Lynx canadensis canadensis (Kerr). CANADA LYNX.

Eskimo Name: Unknown to me.

Status: If the Canada Lynx ever occurs on Southampton, it is only as a straggler from more southern regions.

Mr. Ford told me that in a former year a Canada Lynx was caught on Coats Island.

¹⁵The Southampton Eskimos told me that they had never seen more than four young in a brood. Hantzsch (1913, pp. 151-153), however, states that in Baffin Island, in July, 1910, he saw a female with five young at a place called Tikeradjuak.

This is probably the individual referred to by Soper (1928, p. 39) who tells us that about the year 1918 "a lynx was caught on Coats Island, by Stephen J. Stewart."

One of the Aivilik hunters told me that he had once seen a lynx (the name he gave the animal I did not record) somewhere in the region of Repulse Bay.

Order PINNIPEDIA.

Family PHOCIDÆ.

Genus PHOCA Linnæus.

5. *Phoca vitulina concolor* (De Kay). HARBOR, or RANGER SEAL.

Eskimo Name: The only name for this species I heard on Southampton was *Kashigiak*, the etymology of which is unknown to me. The same name apparently is in use on Baffin Island, though Soper (1928, p. 39) spells it *Kassigiak*. The Eskimo name for the body of water on which the Hudson's Bay Company's Post is located, Coral Inlet, is *Kashigialik*, meaning "a place where *Kashigiak* are found."

Status: According to the Eskimos, this seal is to be found in the waters all about Southampton, especially near the mouths of the larger streams, and in the fresh-water lakes, which are connected with the ocean by fair-sized rivers, but that it is on the whole an uncommon animal. They were formerly seen with some regularity throughout most of South Bay, especially in Coral Inlet, and they bred on the little offshore islands throughout this district. Today they are very rare in much of this region, and are scarcely ever seen near the Post. This may be because they have been hunted too assiduously, or because they have become frightened by the sounds of the comings and goings of motor-boats about Coral Inlet. They still are to be found in some numbers about the mouth of *Kashigiaksuak*, or the Ranger River, near Cape Low. Whether the *Kashigiak* remains in the waters about Southampton the year round is more than I can say. Assuredly we did not see nor take any specimens during the winter of 1929-1930.

Records: During the late summer and fall of 1929 I heard a good deal about Ranger Seals, and was shown several garments and sleeping-bags made from its handsomely marked skin. But I did not actually see one, so far as I know, until we reached the region of Cape Low. There, at the mouth of the Ranger River on September 1 we saw perhaps a dozen of them sleeping or resting on one of the sand-bars not far from the outward rushing current of the stream. At a distance they all appeared to be very dark. We could see that the animals varied considerably in size, some of them being quite small.

As we approached these animals, they took alarm and made off gracefully. After we had made our way a short distance up stream, had anchored, and started taking our camp-equipment out of the motor-boat, we heard a sound not far away and turned round in time to gaze straight into the large, dark eyes of a *Kashigiak* which was making its way deliberately up the stream, apparently headed for a large lake not far inland. It dabbled its head this way and that, blew air through its nose or mouth, producing a strange sound, and then swam along in a leisurely fashion, evidently somewhat curious as to our behavior and sudden appearance, perhaps on one of its favorite sunning-spots.

Amaulik Audlanat, who was ever on the alert for game, made a quick movement, as he grasped his rifle. But the seal evidently sensed that all was not well and turned quickly to drift out with the current. Amaulik took one long shot, then another. The terrified animal shot out of the water, splashed back, and dived into deep water.

Amaulik now forgot all about helping us with the setting up of camp, and made off to

the bar, where we had seen the seals as we came in. We watched him as he crept nearer and nearer the bar. Finally he took a definite position and waited. It was not long until the seals began to return. Finally there were several shots, and we saw Amaulik splashing through the mud and water. We went to help him drag the animal back. It was a rather young individual, about five feet long, and its coat was handsomely marked in such a manner as to remind me of an ocelot. We ate this seal during the following day or two and found it very tasty indeed.

On October 10 Keetlapik killed a Ranger Seal in South Bay not far from the Post. Everyone commented on this capture, for Ranger Seals were not often seen or shot in this section.

On December 6 one of the hunters shot a large male on the ice about a mile south of Bear Island. Mr. Ford told me that he had never before known a seal to be taken at this place at this time of the year.

Mr. Ford told me that the young *Kashigiak* are usually born during the first or second week in July; that they are not born on the ice, as a rule, but on flat rocks or sandy beaches; and that they are dark in color, almost black, marked more or less like the adults, but with finer or smaller spots and blotches. He informed me that during the summer of 1924 mother seals and their young, belonging to this species, were to be seen on all the small islands of South Bay, the islands at Seal Point, and the Tern Islands. At the present time, however, they are only to be found with regularity in the region of Cape Low, though many Ranger Seals were noted near Walrus Island on July 24, 1930.

Annual Cycle of Activities: My impression is that the Harbor Seal is somewhat migratory. It certainly does not live the year round in the region where the young are born; and it is not frequently, if ever, taken along the *sheenah* during the dead of winter, when the common *Netchek*, or Ringed Seal, is so frequently taken by the natives.

It comes to its favorite breeding-grounds with the disappearance of the ice. The young are born in late June or July, on the small flat, rocky islands, or on the sand-bars, principally at the mouths of the larger streams. The food of this species is probably almost altogether fish, though I did not examine any specimens, and am making this statement only upon the reports of the Eskimos. The principal enemies of the Harbor Seal are first the Eskimo, who highly values the beautiful skin, and who uses the blubber and flesh either for himself or for his dogs; the Polar Bear, which doubtless captures a good many; and perhaps the shark, which is decidedly rare in these waters.

6. *Phoca hispida* Schreber. RINGED SEAL.

(Plate VI, figs. 1, 2; Plate IX, fig. 4.)

Eskimo Name: Throughout most of the North Country this common marine mammal is known by Eskimos and traders alike as the *Netchek* or *Netsek* (Soper, 1928, p. 40). The word is in use almost as widely as is *Nanook*, the Eskimo name for the Polar Bear. On Southampton Island young *Netchek* were called *Netchiatsuk*. Soper (see above) tells us that in Baffin Island the old males are called *Tigak*, and the "young after shedding and until one year old," *Netsiavik*. The precise etymology of these words I do not know, save that *atsuk* in the word *Netchiatsuk* is a familiar diminutive suffix among the Southampton Aivilikmiut.

Status: The *Netchek* is by far the commonest seal to be found in the waters about Southampton Island. It is occasionally and locally uncommon; but it is to be found the year

round in all the arms of the sea, and is therefore one of the most important of all mammals from the standpoint of the Eskimo. It is my belief that the *Netchek*, in this region, at least, performs no seasonal migrations of any extent. It is likely, however, that it wanders somewhat in locating good feeding-grounds.

Mr. Ford and others, who have known this section of the North Country well, assure me that the *Netchek* is holding its own very well in spite of the fact that a great many are killed by the Eskimos every year. This is interesting indeed, especially in view of the fact that the *Kashigiak*, or Harbor Seal has been becoming steadily rarer of late years.

Soper (see above) says concerning this mammal: "The ringed seal is abundant in the Baffin Island seas and to the Eskimos is more important than any other form of life. When all else fails, the ringed seal is usually procurable."

Records: When I landed on Southampton Island in mid-August, 1929, abundant evidence of the presence of Ringed Seals was to be seen on every hand. Carcasses of recently killed animals were being skinned by the Eskimos; the dogs were chewing at the offal from these; in the oil-shed were barrels of reeking flesh and fat already stored as dog-food for the coming winter; and out in the harbor, bobbing about in the water, were the dark, rounded heads of the animals themselves, as they played about or came up to investigate the great steamer at anchor in their home-waters. The Eskimos were out hunting the animals almost every day. Sometimes they went after them in the big motor-boats, sometimes only in the little canoes which have supplanted the famous *kayak*. At this time all the animals were fairly well grown; all had shed their light-colored baby-coats, and had much the color and general appearance of the adults. Many of them were, however, quite small.

At this time of the year the Eskimos hunted the *Netchek* almost altogether with the rifle; and, because the seals were well provided with a layer of fat they usually had no difficulty in reaching the carcasses before they sank. In this respect, the *Netchek* was decidedly different from the *Oogjook* which was so thin at this season, that, unless shot *on the ice*, it was almost certain to sink before it could be retrieved by the hunters.

Hunting seals was interesting sport. As we drifted about on the waves, there was no telling when a solemn, big-eyed face would suddenly rise from the waves, the sleek black head turn mournfully this way and that, and the dog-like muzzle sniff the air apparently in suspicion. Most of the animals would make off hurriedly upon being shot at, but some of them would dive for only a moment, then come up to see what all the noise was about.

On September 28 Amaulik Audlanat got a small one as we were returning from Cape Low, not far from Munnimunnek. Many *Netchek* had been seen that day, as well as a few *Oogjook*, a band of Harp Seals, and one or two Rangers.

On October 22 (the harbor at the head of South Bay was now all but frozen over), Amaulik Audlanat and I took the dog-team and *komatik* out onto the ice for a *Netchek* hunt. I was much interested in Amaulik's tactics. First, after we had fastened the team so that they could not follow in a burst of enthusiasm, we surveyed the ice with our binoculars. Far out at the edge of the black "leads" which had not yet frozen over, numerous *Netchek* were to be seen. Amaulik, without saying anything to me about the matter, evidently decided upon what he thought to be the best course; then told me he would go after some of the animals. He started deliberately, making his way about the chunks of ice, taking care to test the leathery new ice, which sometimes actually appeared to give under his weight, keeping himself as well as he could back of chunks of ice so as not to frighten the seals by his appearance. Finally I saw him drop to hands and knees and make his way up to a seal. The animal raised its head frequently and looked about, but evidently it did not see the Eskimo, for it never

tried to leave. After Amaulik had shot this seal, he simply sat on the ice, waited for all the other seals to dive into the water and to return to their sunning-spots. Then he went after the next one. In the course of two hours, he had three fine large *Netchek*. Shooting seals is not always as easy as this; sometimes they are unreasonably wary; and if the wind is changeable, it may carry scent of the hunter all about over the ice and make all the animals timorous.

On the following day we got another *Netchek*, and Jack Ford shot two not far from the Post. On October 24 Keetlapik got two not far from Bear Island. On the following day Scotch Tom (Angoti-Marik) and others shot several *Netchek*, but most of them could not be secured because of the thin ice. The ice was so weak it would not hold the hunters; on the other hand it was so thick that it was impossible to go through it with the frail canoes.

On October 26 Jack Ford and I spent a good deal of time studying the behavior of *Netchek* and trying to get a specimen. The ice was very thin over much of the Bay. More than once I saw a *Netchek* trying to find a solid place, where it might come out and bask; but the ice would not hold. As a rule, such animals came up under the ice, broke through with a cracking, slushy sound, and shot up easily, only to break through and try again. We tried crawling up on some of the animals that had found themselves a solid place on which to bask. I learned that scraping on the ice with the feet will sometimes rouse their curiosity and keep them from taking fright. They must hear well, for, when we whistled, they would sometimes put up their heads and listen intently for an instant.

On October 28 I saw my first "seal holes" in the ice formed above deep water. These holes were about eighteen inches in diameter and the edges of the holes were roughish and piled up somewhat in the manner of the mud about the hole of a crayfish. By waiting patiently at one of these holes, I finally had the pleasure of seeing one of the seals come up to breathe. When it first appeared, it made a peculiar sort of sucking sound, perhaps because it had had a long swim between breathing-holes. I never measured the distances between these holes, but I do know that many of them were a considerable distance apart, surely several hundred yards. Many of the holes were to be found along long cracks in the ice. The animals in coming out of these holes must sometimes have some difficulty, for the ice is smooth, the surface of the ice may be as much as two feet or more above the surface of the water, and it would seem to me under the circumstances that the seal would have to *shoot* out, if it were to get out at all; it could hardly crawl out. Getting back in, is not, however, a very difficult matter. At least all the seals I saw going back into the water did so in a great hurry and apparently without any trouble whatever.

On October 30 in the bay west of Seal Point, in the region of the little Tern Islands, I saw a great many seals, most of them undoubtedly *Netchek*, basking at their breathing-holes, and lined up along the edge of the open water. There must have been one hundred animals in sight at one time in mid-afternoon. Across the ice drifted strange whining and moaning cries, which I think must have come from the seals, for there were no birds about, and no other mammals of any sort, so far as I could see. On the following day, I saw almost as many seals again in the same place; thereafter I never saw so many, for the Eskimo learned of their abundance there and began hunting them assiduously.

During November, at least on the pleasant days, we frequently saw *Netchek* on the ice of South Bay not far from the Post. Some of their breathing-holes were not more than a mile from the shore, and here we could plainly see the animals, when they came up to bask.

On November 25 at East Bay I had my first experience in hunting the animals with Husky dogs. In this sort of hunting the Eskimos merely drive the team out upon the ice, then let them go where they will. Sooner or later one of the dogs, usually the leader, will

give a low, joyful bark, or a wistful whine, and in response every dog will leap to attention, as it were, and make off at a terrific gait for the seal-hole. Sometimes they have to dodge this way and that a little, but it is not long before they have ferreted out the hole and then they all stand about, excited as fox-terriers. The holes are not always to be seen easily. The first one I saw which had been found in this manner was actually covered over almost completely with a thin crust of ice and snow; but the dogs continued to show interest in the place, and with a little digging it is possible to expose the hole. The Eskimos told me that these holes usually had a strong odor of *Netchek* about them. This, I can affirm, is often the case. The odor, when I first detected it, made me think of the musk of a weasel. It is not to be wondered at that the keen-nosed dogs can smell such a strong odor some distance away.

On December 1 at East Bay Muckik spent a great deal of time (more than an hour) stalking a *Netchek* and failed to get it.

During January, 1930, *Netchek* were killed by many of the Eskimos from time to time, at Cape Low, Munnimunek Point, Bear Island, Native Point, and elsewhere. Females killed at this period carried embryos, but I did not procure any of these embryonic specimens during January.

On February 3 one of the Eskimos brought me a good-sized, creamy-white embryonic specimen, which was, I should say, almost ready to be born. It was well covered with woolly hair or fur, its eyes were open, its flippers and claws well formed, but it had no visible teeth. The end of the tongue was slightly double-rounded or furcate. It was not easy to prepare the skin for there was a layer of very tough, somewhat fatty tissue just under the skin which was very difficult to remove.

At about this time (the exact date was never ascertained) a yellow-white, adult *Netchek* was killed by one of the Eskimos at Native Point. The coloration of this individual was about that of the newly born young, but it was full-grown and the hair covering the body was that of the adult, not that of the young. Unfortunately I never saw this specimen, but Mr. Ford thought it was albinic. He said that he had seen perhaps half a dozen such animals during the course of his life in the North.

The month of March is called *Netchialut* by the Aivilikmiut, signifying the time of the year when the young *Netchek* are born. On March 20, the Eskimos at Native Point killed several animals, including three females carrying embryos, and one of these embryos they brought in to me. It was noticeably larger than the one I preserved during early February. During the month we constantly heard reports of the finding of young seals in their "nests" on the ice. The young are born in sheltered places, caverns, or little roomlike cavities in the salt-water ice. These chambers are connected with the water, so that the mother seal may come and go. I was told that at this time the male *Netchek* are not to be seen with the mothers and young; that the mother seal may bare her fangs, bite, and growl like a dog, if her young are threatened; and that most of the "seal-nests" are to be found where the ice is rough, where there have been cracks and tidal shiftings during the winter. I never actually saw a mother seal with her young in the "nest," but I saw several of the "nests."

On April 5 Muckik shot an exceptionally large female, which was accompanied by a long-haired, white, young one. The Eskimos told me that by this time most of the young had been born, but that a few of the gravid females were yet waiting about their "nests" for the birth of the *Netchiatsuk*. Mr. Ford told me on April 16 that he thought most of the young *Netchek* had been born by that time.

On April 18 a young specimen in very interesting change of pelage was shot near Bear Island. This animal, which was moulting its natal coat, had a decidedly shaggy, odd

appearance. While we were skinning this specimen, much of the shaggy hair dropped out.

On April 24 I examined an ill-smelling male specimen, which had been killed at the floe. The seals were very common along the floe at this time, and the Eskimos killed a great many. On the following day, we killed three, two adult males and a sub-adult female, probably born in March of the preceding year. I asked Tommy Bruce how old this specimen was and he showed me the white color of the underside of the claws in reply. The male seals had a most offensive odor.

On this date I had the interesting experience of seeing one of the Eskimos harpoon a *Netchek* at its breathing-hole. The hole was equipped with a wire rod, with a float mid-way, which stuck down into the water in such a way as to move the minute a seal started to come up. The hole itself was roofed over lightly to keep the seal from seeing that anything was amiss. There was a bit of down on the water, too, which would bob a little the moment waves were caused by the rising seal. When the bit of down bobbed and the wire-rod shook, the Eskimo lifted his harpoon and struck a savage blow, not at the seal, which he could not see, but merely through the snow at the place where he knew the seal would be. And he got the seal.¹⁶

A male specimen taken at this time measured 1165 mm. in length, 940 mm. in circumference at the front flippers, and 350 mm. across the chest between the front flippers. A female measured 1080 mm. in length, 720 mm. in circumference at the front flippers, and 227 mm. across the chest between the bases of the front flippers.

On April 30 Muckik shot an exceedingly handsome, but most foul-smelling male *Netchek*, the skin of which was beautifully marked with rings and spots. It measured 1274 mm. in length, 985 mm. in circumference at the front flippers, and 320 mm. across the chest. On the same date several other specimens were taken, examined, and two measured. A male measured 1165 mm. in length, and a female 1080 mm. in length. The eye of the male (dead) measured 32 mm. in diameter.

From May 7 to 15 several *Netchek* were killed at the floe and some of these were measured and critically examined. A female shot on May 8 measured 1215 mm. from tip of the nose to tip of the hind flipper. A male taken on May 12 measured 1145 mm. The specimens taken were all fat, most of them exceedingly so, and the stomachs we had opportunity to examine were in every case well filled with remains of *kingook*, an abundant crustacean, and with small fish. One stomach held the remains of what must have been a two-foot *Ichalook* or salmon-trout.

Even as late as May 25-26 the Eskimos continued to kill young animals to which natal fur was still adhering. On one of these dates, nineteen seals were killed. Ten of these were young, most of which still had traces of the natal pelage.

On May 29 Amaulik Audlanat and I saw several on the ice, as we were making our way from the Native Point floe back to the Post. We both had been sick and were not in very good spirits. Amaulik nevertheless tried to stalk the seals. I remained with the dogs, standing on the traces to keep them from leaping off. I could tell from their behavior that they were very much excited at seeing Amaulik starting off with his rifle. I was so weak from a three days illness that I could hardly see straight, but I stood there stolidly enough hoping for the best.

All at once I heard the big leader-dog whine, saw him stand up, and before I knew it I

¹⁶One of the most interesting features of this method of catching seals is the slender wooden box in which is kept the wire-rod seal detector. It is apparently very important that this piece of wire be kept perfectly straight, and the Eskimos take meticulous care of it.

was in front of and under the big *komatik* being dragged along at a merry clip. I finally got myself out of the way, not much the worse for wear, and let the dogs go on to Amaulik. Needless to say we got no seals that day. But we were both so weak we did not greatly care.

During June, while the harbor-ice was beginning to crack and to break up, *Netchek* were to be seen everywhere. They were especially fond of basking on the ice at the edge of the widening pools.

On August 4 we saw many *Netchek* in the water about Bear Island.

Annual Cycle of Activities: The *Netchek* is, as Soper has said, one of the most important of the northern mammals from the standpoint of the Eskimo. The skin is used in many ways: for boot-tops (*Oogjook* skin is usually used for the soles or foot portion); for *kooletahs*; for trousers; and for mits, trapping bags, and such articles. Most of the dog-harness is made from *Netchek* skin, but the traces are usually of *Oogjook* skin, and the whip is nearly always made of walrus-hide. *Netchek* skins are often used in making the *tupek*, or tent, and were probably used extensively at one time in the construction of the *kayak*. The blubber is used as food; as fuel (it is burned in the shallow stone *koodilik* or seal-oil lamp); and as light. The intestines are stretched for windows in the igloos at times, though the Eskimos with whom I travelled seemed to prefer slabs of fresh-water ice. The flesh is eaten by both the Eskimos and the Husky dogs, and is sometimes the most dependable source of dog-food to be found. It is said that the bones, too, are used in making various implements. I can offer no remarks upon this matter, for I never happened to see the Eskimos making anything from these bones, and did not hear them discussing any such implements.

Aside from the Eskimo, the worst enemy of the Ringed Seal is probably the Polar Bear. Sharks may occasionally molest them, and Killer Whales, which must be very rare anywhere in Hudson Bay, may destroy them upon occasion. It has been said that walrus sometimes kill seals. I think this must be a mistaken notion.

Other Records: James Clark Ross tells us that this seal was to be found at Port Bowen, Prince Regent Inlet (1826, p. 94) and on both sides of the Isthmus of Boothia (1835, p. xix).

Kumlien (1879, p. 55) states that the species was common in the bays and fjords of Baffin Island from Hudson Strait northward to the head of Cumberland Sound.

Low (1906, p. 279) calls this species "the common small seal of all the coasts."

Hantzsch (1913, pp. 157-160) considers it the commonest seal in the region of Blacklead Island, near Baffin Island.

Soper (1928, pp. 40-45) tells us that the "ringed seal is abundant in the Baffin Island seas and to the Eskimo is more important than any other form of life."

Mathiassen (1931, p. 27) in referring to "seals" probably has this species in mind since the *Netchek* is decidedly the most common seal about Southampton Island.

7. *Phoca groenlandica* Erxleben. GREENLAND OR HARP SEAL.

Eskimo Name: *Kiulik*, the first *k* pronounced somewhat as the *ch* in the German word *Buch*. Soper (1928, p. 45) tells us that the same name is given the animal by the Eskimos on Baffin Island. He also gives us *Kairelik*, on the authority of Hantzsch. Low (1906, p. 279) writes the word *kirolik*. The etymology of these words is unknown to me.

Status: Judging from our meagre data, this is one of the rarer species of seals in the waters about Southampton Island; it is, furthermore, apparently rather more definitely migratory than the other species, and it is seen, according to the Eskimos, more commonly along the southern coast than along the Fox Channel shore, or in Frozen Strait and Duke of York Bay.

Records: The first Harp Seals were seen along the west shore of South Bay, on September

9, while we were returning from our trip to Cape Low. There must have been almost a hundred animals in rather a closely knit herd, swimming and disporting themselves not far from the mouth of the Kirehhofer River. They were easily recognized, not by their shape nor color, but by their interesting habit of standing up in the water as they swam along, lifting not only their head and neck, but their shoulders and apparently their front flippers out of the water, and then sinking forward gracefully as they went onward.

Again on September 8 we saw a small company of Harp Seals just south of the little Kikkuktowyak Island, east of Native Point.

Harp Seals were seen several times during our sojourn at Seahorse Point; and on September 22 I found the decapitated carcass of one, which had been killed by a Polar Bear in a narrow fjord. In eating the seal, the bear had crudely skinned it from the head and neck backward. The Eskimos saved what remained of the skin, for they apparently do not get Harp Seals as often as they do the other varieties.

Harp Seals were again seen near Leyson Point, not far from the mouth of the Anderson River; and south of Kikkuktowyak Island from September 24 to 27; none was seen after this date during the fall of 1929; and we did not see any during the winter nor hear of the killing of any at the floe.

A few were seen again in the spring (probably in latter May or early June) by Muckik and Kooshoak in the vicinity of Leyson Point, and a rather large herd was noted near Bear Island in South Bay on July 24, 1930.

Thus it appears that the Harp Seal, as a rule, does not occur about Southampton save as a migrant species.

Other Records: Nearly all the early explorers mention seals of one sort or another in their writings, but usually it is not clear from the statements made which species was actually encountered. James Clark Ross (1827, p. 94) reported Harp Seals from the west side of the Isthmus of Boothia. Kumlien (1879, p. 61) noted this seal frequently in spring and autumn in the southern waters of Cumberland Sound; but tells us that they stayed there "only a short time." Bell (1885, p. 5DD of Appendix) considered this the commonest seal in all parts of Hudson Bay at all seasons.¹⁷ Preble (1902, p. 70) says: "I saw no skins, but the species was reported at Fort Churchill."

Low (1906, p. 279) says: "The Harp Seal is more or less common on the northern coasts and southward along the Atlantic coast of Labrador, at all seasons. In Hudson Strait they are rare in summer, but are not uncommon after the shore-ice forms in autumn and before it leaves in the early summer."

Hantzsch (1913, p. 156) found no evidence that Harp Seals had ever been taken by the Eskimos about Blacklead Island. Soper (1928, p. 45) considers this species "one of the rarer species of seals inhabiting the seas about Baffin Island." Mathiassen (1931) merely mentions "*seals*," but gives us no hint of the species he may have encountered.

Mr. Ford told me that great droves of the animals were seen about South Bay on September 21, 1925. He also noted a few of the animals about Coats Island.

Genus ERIGNATHUS Gill.

8. *Erignathus barbatus* (Erxleben). BEARDED SEAL; SQUARE FLIPPER.

Eskimo Name: *Oogjook*. Low (1906, p. 280) spells this word *Oujuk*. Soper (1928, p. 46) gives us the same word, with slightly different spelling: "*Ogjoek*, *Ukjuk*; the young,

¹⁷It is possible, of course, that this statement was accurate at the time it was published. It certainly does not apply at the present time.

Terriglo, according to Hantzsch." According to my experience on Southampton Island, the second of the names given by Soper is really not a name of the Square Flipper, but rather one of the commonest words for *seal-fat*. The Southampton Eskimos used several words, which sounded much like *Oogjook*; and the proper stressing of the sounds of *g* or *k* in these various words was very important. On Baffin Island, of course, the name of the Square Flipper may be pronounced *Ukjuk*; it is never so pronounced on Southampton. The etymology of these words is unknown to me.

Status: The *Oogjook* is not on the whole abundant in the waters about Southampton Island. At times the Eskimos come across considerable numbers of the large seals at the edge of the floe, and they always kill a good many during the course of the year, but as compared with the abundant *Netchek*, or Ringed Seal, the *Oogjook* is a rare animal.

So far as I could learn by personal observation and conversation with the Eskimos, the *Oogjook* is to be found the year round. I recall that we saw it most commonly along the edge of the floe near Native Point during the early spring of 1930, and that we never saw it basking on the ice of South Bay during mid-winter, as we did the Ringed Seal. In fact I am inclined to agree with Kumlien (1879, p. 62) who says, regarding the species, as observed about Baffin Island: "They remain in the sound [probably Cumberland Sound] only during the time there is open water as they have no *atluk* (breathing hole)." My general impression of the mammal is that it is not migratory, and that its abundance is more or less regulated by the food-supply, and by the extent of the open water.

Records: The Square Flipper, with its oddly shaped head, its noticeable whiskers, and its very characteristic habit of bending its body sharply so as to *curve* gracefully into the water in diving, is easily recognizable even at a considerable distance. Its manner of diving has been described by Kumlien (*ref. cit.*) as "turning a somersault"; such an exhibition, according to my experience, usually results from being fired at, for if the animal is really terrified, it dives to deep water with amazing speed, the rear part of its body rising in the air as the head starts downward, and the flippers whacking the water with a splash as the big form disappears.

I saw my first Square Flippers near camp at Four Rivers on September 4 and near Native Point on September 27. On October 13 I had the rather unusual experience of seeing one very close to the shore at the head of South Bay, not far from the Post. I was sitting on the rocks when the animal first appeared. It saw me at once, and moved along rapidly near the surface of the water, coming up frequently to look at me, apparently considerably frightened. I can remember how surprised I was at the size of the creature, for it must have been at least eight or nine feet long. During latter October I saw one or two *Oogjook* nearly every day in the waters of South Bay, usually at some distance from the shore. On October 31, using my binocular, I counted five on the ice beyond Seal Point. I noted that the animals were not to be seen anywhere near shore, that they evidently had come up on the ice only near channels where the water was definitely open, and that they were not near "blow holes" as were the smaller Ringed Seals, which were so numerous nearer shore. The Square Flippers appeared to be dozing and basking. They moved a little now and then, but on the whole were less suspicious than the Ringed Seals, which frequently lifted their heads and looked about.

When I spoke to Sam Ford about the habits of the various seals, he told me that Polar Bears frequently capture the Square Flippers because they are so given to indulging in these naps on the ice. The bears steal up on them by easy stages, making their way directly across the ice in the open. The Eskimos also crawl up to the seals, using a square of white

canvas or a piece of Polar Bear skin so that they will not appear too dark against the snow.

On December 19 we heard the amazing tale of five of our Eskimos who had drifted off on the ice from Munnimunnek Point, to be gone almost a week. The wind had carried the ice about and finally brought them home again. They had killed five *Oogjook* on the day they were set adrift, so they had plenty to eat; nevertheless one of the men was almost dead from exposure by the time they got back to their encampment.

On January 18, 1930, Muckik killed a large *Oogjook* near Leyson Point. He and his son, Kooshoak, had seen several in that region. On January 21 an Eskimo killed a female not far from Cape Kendall. This animal contained a well-haired embryo, about three feet long. On January 21 Amaulik Audlanat told us that during the preceding three weeks the Eskimos, who were hunting about Capes Low and Kendall, had killed several Square Flippers. On January 29 one of the Eskimos at Native Point killed a female with an embryo three feet long *in utero*.

On February 3 Akaook brought me a well developed embryonic specimen, which he had taken from an animal killed at the floe of Native Point. The general color of this specimen was blackish brown or gray, the back was considerably spotted with white. The hair was apparently well formed all over the body. The tip of the tongue, I noticed, was different from that of an embryonic Ringed Seal, being simply rounded, whereas the Ringed Seal's was double-rounded, and somewhat forked at the tip.

On our trip to the floe at Native Point during latter April we saw a good many Square Flippers, principally on April 26, when the animals appeared to be playing and chasing each other in the channels of open water. On April 30 Muckik killed one, but it sank before they could get to it with the canoe. I learned that at this season the animals are so lean that they sink very quickly when they are killed; a wounded animal will float, however, so the Eskimos sometimes try to shoot them in such a way as not to kill them instantly. I was told by my friends, that, though the young *Oogjook* is born with gray, mottled coat, it soon loses this coat and takes on one of a yellowish-brown color, which is worn for about a year.

On our mid-May trip to the floe we saw many Square Flippers, and killed several, but most of them could not be retrieved because they sank so quickly. On May 12 we suddenly came upon one lying asleep on a cake of ice. It was most interesting to watch two of the Eskimos, Amaulik and Tommy Bruce, slipping up on this seal. After stalking fully three-quarters of an hour, they finally shot, and though they mortally wounded the animal it managed to get to the water and promptly sank from sight.

On May 27, while I was walking along the edge of the ice, a big Square Flipper suddenly announced his appearance by giving a strange windy, whistling cry. I sank to my knees as unostentatiously as I could, took a firing position, and succeeded in killing the animal; but although it floated for some time, bleeding profusely all the while, it had sunk by the time we could get the canoe floated. Before I shot this seal, it moved along just under the surface of the water, swimming slowly, its body having a strange bottle-green color.

On the following day, while stationed on the ice waiting for the seals to come near at hand, I saw several *Oogjook*. I was especially interested in watching one make its way from the water upon the ice, where it was to sun itself. As it swam toward the solid ice it stuck its head up through the mush-ice. Far out in the channels the heads of *Oogjooks* were to be seen frequently. The animals spent a good deal of time lolling in the water, looking this way and that, rising high for an instant, then sinking gracefully back, simply withdrawing themselves rather than diving forward and downward. More than once I was impressed with the oddly sad, and somewhat dog-like facial expression of these creatures.

On July 24 Amaulik Audlanat and his party killed five *Oogjook* on the ice near Walrus Island, and succeeded in getting them all. The seals were not at all fat at this season, and invariably sank at once, unless they were killed on the ice. Two of these animals, an average male and female, were brought back to me. The male measured 8 ft. 7 inches, over all, and the female 8 ft. 5 inches. The female was noticeably heavier, however, being 68 inches in girth just back of the front flippers, as compared with the girth of 56 inches in the case of the male.

On July 30 Jack Ford shot a fine large female not far from Bear Island. No young accompanied this female.

On August 2 Amaulik and his party got one on the ice beyond Bear Island. On August 4 we saw two *Oogjook* among the cakes of ice near Bear Island.

Annual Cycle of Activities: The month of April is usually called *Terrigtulliut* by the Southampton Eskimos; this word signifies the time when the young Square Flipper Seals are born. I never saw a live young *Oogjook*, but Sam Ford told me that they are born in the open on cakes of ice, that there is never more than one young, that the females only are to be seen with the young, and that they weigh about 120 pounds when first born.

Our data are so meager that I cannot offer any remarks upon the distribution of the sexes at this time of the year. According to my observations, the young animals must be born far out on the ice, for we never saw one on our several trips to the floe; and furthermore, we saw both male and female adults wherever we went.

The Eskimos told me that the *Oogjook* eats fish to some extent, but that it is especially fond of clams, which it procures from the ocean-floor. In this respect it is similar to the walrus. According to the coloration of the material in the alimentary tract of one killed at the floe, I should say that they occasionally eat the *kingook* or sea-louse, which has a pinkish color.

The Eskimos prize the *Oogjook* highly. They eat its flesh and feed it to their dogs. They are especially fond of the intestines, which they strip of their contents with a sweeping gesture, then braid crudely, and (at least in the instance I have in mind) boil in salt-water. I found these intestines very good indeed; they were delicate and flavorful. The flesh I did not like so well. I never tasted raw liver, so can offer no comparison between it and the raw liver of the Ringed Seal.

Oogjook skin has a great number of uses. The bottoms of practically all *komiks* (boots) are made of it; heavy ropings, lashings, and dog-harness are fabricated from it. Whips, however, are usually made of walrus-hide. The skin of immature animals, or of unborn young, is used for mits, or in a decorative way. The Aivilikmiut have not used the *kayak* for many years (perhaps, indeed not for centuries), so they do not use *Oogjook*-skins to cover these craft; but wherever Eskimos use the *kayak* the skins of this seal are invaluable.

The principal enemies of the *Oogjook* are the Eskimo and the Polar Bear.

Other Records: James Clark Ross (1835, p. xxi) tells us that these large seals were to be found "in summer" on the shores of Boothia Felix. Kumlien (1879, p. 62) gives us an interesting account of the behavior of the animal, describing its habits and its food, and telling us of a fetus, "4 feet 7 inches" in length, which he procured on April 28. Bell (1885, p. 52DD. Appendix II) saw skins of the animal in possession of the Eskimos about Hudson Strait in 1884.

Preble (1902, pp. 70-71) says: "We saw numbers of these seals both to the north and south of Fort Churchill, and the species probably reaches all parts of the Bay." He describes in detail a specimen killed on July 20 north of York Factory.

Low (1906, p. 280) says that the Bearded Seal is "common on all the coasts" of Hudson Bay and the Arctic Islands.

Hantzsch (1913, p. 156) considers the species rare in the region of Blacklead Island, near Baffin Island. Soper (1928, pp. 46-48) gives us a good account of the species as it is found about Baffin Island, and considers it "not . . . rare."

Mathiassen (1931) does not mention the species, though he must have encountered it.

Mr. Ford told me that every year since coming to the region he had seen *Oogjook* in the waters surrounding Southampton and Coats Islands, virtually every month in the year.

Genus CYSTOPHORA Nilsson.

Cystophora cristata (Erleben). HOODED SEAL.

Eskimo Name: Soper (1928, p. 48) gives us the following: "*Netsivok*; *Netsivak*, according to Hantzsch." I did not hear the Eskimos at Southampton refer to this species.

Status: Low (1906, p. 280) says: "The Hooded Seal is unknown to the natives of Hudson Bay, and is an exceedingly rare visitor in Hudson Strait." Soper (see above) lists the species, but evidently regards it as very rare about Baffin Island. It apparently has never been taken anywhere in the waters about Southampton.

Family ODOBENIDÆ.

Genus ODOBENUS Brisson.

9. *Odobenus rosmarus* (Linnæus). ATLANTIC WALRUS.

(Plate VII, figs. 1-4).

Eskimo Name: The name of the walrus, *Aiviuk* (pronounced *Eye-vi-uk*), has been spelled in a great many ways by the various travellers, who have made reference to the Eskimo names of the creature. Soper (1928, p. 48) spells it *Aivik* and tells us that Hantzsch (1913, p. 155) writes it *Aivek* and *Aivirk*. Low (1906, p. 280) also spells it *Aivik*. Others have spelled it *Iviuk*. This difference in spellings does not indicate dialectic variations in pronunciation, so much as it does the difficulties encountered in spelling a word so subtly pronounced.

The principal race resident upon Southampton Island today call themselves the Aivilik-miut, *the people who live by hunting walruses*. This race originally inhabited the Repulse Bay country, where walruses must have been numerous during long centuries. The word *Aiviuk* probably is not onomatopoeitic; in fact the Eskimo names of mammals usually are not. The etymology of the word is not known to me.

Status: The Atlantic Walrus, according to various reports, is not as common today in the waters about Southampton as it formerly was. Nevertheless, to my great satisfaction I saw many of the huge beasts and will carry with me for a long time the feeling that there are wilderness waters in the North Country where such magnificent creatures can continue to live, in spite of all the efficient fire-arms and leather-making processes in the world. The walrus is to be seen at any time of the year. They are most often found near the ice, though we saw them in the open waters of Evans Inlet in mid-summer. They are migratory, I should say, but only as food-problems dictate.

Records: I shall never forget my first glimpses of walruses close at hand. I was leaning over the gunwale of the motor-boat, as we were making our way eastward from Native Point on September 19, 1929. I must have been gazing in a dreamy sort of way out over

the gray-green water at the flocks of Old-squaws, which rose like gray clouds along the distant horizon. The hum and throbbing of the motor had a soporific effect on all of us; the sun was warm; it was easy to be lazy and thoughtless. All at once, without so much as a ripple of warning, the strangest of strange faces rose from the depths; a wrinkled face colored like what we imagine to have been the skin of a prehistoric monster; strong whiskers; gleaming tusks. I remember the thrill I felt, as I shouted out "Aiviuk, Aiviuk," as the beast glared at me solemnly and sank once more to the depths. The Eskimos were all excitement in an instant. Rifles came out. The men took positions all over the boat, ready to shoot. But it was a long time before we saw any more walruses.

Then suddenly we found ourselves surrounded by the animals. I am willing to hazard a guess that we saw as many as fifty at one time, some of them solitary old males, others in groups of from four to twelve smaller animals, huddled together, shouldering each other, rolling this way and that, plunging slowly and ponderously along, diving down only to rise in a short time and continue the strange rolling and shouldering. I was altogether fascinated by the appearance and behavior of the creatures. Their faces were so mysterious and ugly; their eyes, or eye-sockets, gleamed so redly; they had the appearance of such weight, strength, and toughness, that I began to wonder whether we were altogether safe. And when we turned the boat, so as to run among one of the herds, I was so eager to watch the churning of the water, that it never occurred to me that anyone might want to shoot them.

Only a few of the animals seen at this date had very large tusks. It seemed to me that these old bulls were almost twice as large as the others, and when they rose from the water to gaze about, their eyes gleaming balefully, I felt that I had indeed never before seen a really wild beast. For some reason the Eskimos did not take any walruses on this date, nor did they shoot at them more than once or twice.

On the following day many walruses were seen near the mouth of the Anderson River. On September 24 a small herd were noted rather far out from shore about ten miles west of Seahorse Point. At Seahorse Point proper not many of the animals were seen, but on the outer shore of William Baffin Islet I found a beautiful skull with tusks intact, and pondered, as I turned it over, upon that staunch explorer of far-gone years, who had named that very place, after the "morses" that he and his crew had seen there. For Seahorse Point has long been known among the Eskimos as an especially good hunting-ground for walruses.

On September 27 we saw a great many walruses as we were crossing Native Point Bay, and once more had a thrilling time steering the boat, so as to run as close to the angry, frightened brutes as we could. Sometimes the water seemed actually alive with them, so closely packed were the great bodies. In their haste to get away they lunged over each other, coughing and grunting, rising high in the water, sinking down, endlessly rolling about as they swung their great flippers through the brine. This herd of walruses was very important to the Eskimos living at Munnimunnep Point, for they were able to kill several and to cache the bodies safely for winter dog-food. By October 17 we learned that at least seven walruses had been cached at Native Point.

It is hardly impossible to overestimate the value of the walrus to these people. From the standpoint of an adequate supply of dog-food there is no animal that quite compares with it, for one walrus will last a good while because of its great size. The Eskimos eat the flesh and blubber also, though I believe they prefer caribou and other sorts of meat.

On October 31 Jack Ford and Keetlapik saw a walrus resting on the ice not far from Bear Island. One of the Eskimos at the Post also told me, that he had heard some *Aiviuk* coughing not far from Seal Point.

On November 3 Amaulik Audlanat told us that walruses were very numerous not far from Native Point, but that the ice was so treacherously thin, that it was impossible to go after them. Natives who were hunting in the region of Cape Low also reported many walruses, especially in the waters of Sir Thomas Roe's Welcome. On November 16, while an Eskimo was waiting for seals along the Munnimunnek floe, two walruses suddenly broke up through the ice and frightened all the seals away.

On January 11, 1930, Kaliquilik killed one near Munnimunnek Point. On January 18 Muckik saw many at Seahorse Point and killed a large one for dog-food. On January 28 Amaulik Audlanat saw many at Cape Low and heard that they had been seen in equal abundance at Cape Kendall. On the following day Billy Boy killed one at Native Point, but could not reach it in the canoe. On January 31 I had my first meal of walrus-meat. I found it a little tough and strong of flavor. Perhaps it was not quite thoroughly cooked.

On April 16 Amaulik Audlanat and Pialak secured three walruses not far from Bear Island; one of these was a mother with a newly born young. The men used a canoe in getting these animals. The walruses were asleep on ice-cakes and the hunters had but to steal upon their quarry and shoot them, apparently without any great trouble. In the old days, of course, hunting with the harpoon was not quite so simple.

The baby walrus was most interesting. It was almost five feet long, and I noticed that its front flippers had a definite area of dull black, marking the gray-green monotone.

On April 26 I had my first experience with walruses at the floe. I was waiting for seals, stationed on a high pinnacle of ice not far from the water's edge. To one side of me extended a large area of rather clear, newly formed ice about five inches thick. As I was keeping my lookout, I suddenly heard a loud, cracking sound and looked down almost into the mouth of a walrus that had come up through the ice to look around. I had scarcely gotten over the impression of seeing that first animal, when another broke through the ice not far away. Then both the creatures saw me and went down to come up out in the open water some distance away. Neither of these animals had very large tusks. On this same date I ate my first raw walrus-meat. 'I could not help being amused at the scene of this meal. We were in a little tent at the edge of the floe. The sides of the tent had been reinforced with blocks of snow. Candles gave us a little light. On the snow in front of us lay the bodies of several seals, a haunch of frozen caribou meat or *Tooktoo*, and the heads and skins of three walruses. It was a gory mess. Underneath one of the skins was a rock-like mass, the frozen contents of the stomach of one of the walruses. We cut our meal from this beast or that beast, as we chose, a sliver of *tooktoo*, a slab of blubber. It seemed so funny to be hacking off part of the face of a walrus for a meal and at the same time to be hoping to save that skull as a specimen. I found that caribou-meat with walrus-blubber was a good combination and learned to like it thoroughly. Then I found that the clams which composed the stomach contents were of a very delicate flavor, and I ate many of these both raw and cooked. In looking through the stomach contents I was amazed that there were so few shells of any sort. In fact I found only one or two pieces of shell, by which the species of mollusk might be identified.

On May 5 I secured a new-born baby walrus from one of the Eskimos. In skinning this animal out, I found that the eyes were perfectly opened, but that the teeth were nowhere through the gums; that the two mammary glands were below and on either side of the navel, and that there was a definite and rather thick layer of fat under the skin, even in this very young animal.

On May 10 I had a memorable experience at the floe south of Bear Island. We had left

camp wondering whether the weather would be fair or foul, and by the time we had reached the edge of the water we knew it was to be the latter. A strong southerly breeze sprang up, and the channel of open water began slowly to close. Hordes of eiders rose in the gathering storm to make their way to what open water they could find. Snow began to fall heavily. It became foggy. All at once, amid the seething and crackling sounds of the ice, I heard a new sound, a coughing, a low groaning, and looking out, I saw walrus-heads sticking out of the water here and there. The beasts evidently were trying to keep near the channel themselves and they seemed not to be having a pleasant time among the grinding ice-chunks.

On June 5 Tommy Bruce saw several walruses near Kikkuktowyak Island. Among them were some very small young. On June 23 Amaulik Audlanat shot two at the floe south of Native Point. On July 16 and 18 a party of hunters killed several walruses, saving the bodies for dog-food, and keeping the skins.

On July 27 Amaulik Audlanat and his party shot two specimens, a male and female, which they saved for me as specimens. The male, I was told, was as large an animal as they had ever seen. It was very interesting to me, because the handsome, heavy tusks were most symmetrical, and they all but met below the mouth. When I commented on the fact that they almost touched, I was told that they sometimes actually touch, rub against each other, or even eventually cross each other. This male animal measured 12 ft. 5 inches in length, and 9 ft. 6 inches in girth at the chest.

The female was smaller, had much shorter and slenderer tusks, and thinner skin, especially on the neck. She measured 10 ft. 8 inches in length and 7 ft. in girth at the chest. The stomachs of both were empty.

The Eskimos told me that when they got these animals the males, females, and young were all close together on the ice. They said that the stomachs were empty because the animals had been on the ice so long they had not had a chance to do any feeding. When they were pursued the males put up their heads and bellowed loudly, opening their mouths widely.

On July 30 and August 2 Amaulik Audlanat and other Eskimos, who were travelling about South Bay and near Walrus Island, saw a great many walruses.

Mr. Ford told me that he thought the young walruses were born at almost any time of the year, perhaps most frequently in spring and summer, and that they were foaled on the ice, or on the rocks, without any attempt at finding a shelter. But one young is born. It is generally believed that the young have no noticeable tusks, until they are two or three years old. The tusk is prized for its *tooghak* or ivory, for which the Eskimos have many uses.

Annual Cycle of Activities: Walruses apparently do not migrate in the waters about Southampton. They have to move about to find food, however. So far as my observations go, the food of the walrus is almost exclusively mollusks, which are procured on the floor of the ocean, apparently in fairly deep water. I do not know how the animals manage so well to eat the clams and to discard the shells. The teeth of a walrus appear to be very clumsy, yet evidently the animal knows how to manage this matter perfectly. It is said that walruses sometimes eat small fish, and I even heard it said that they sometimes kill seals.

Walruses may be very savage at times. I was told of one Eskimo who was killed in an encounter. The man was out in his kayak, and the walrus attacked, upset the craft, and plunged its tusks through it, then crunched the Eskimo to its chest with its mighty flippers and proceeded to jab and punch him with its tusks until he was a pulp. I am ready to believe that the walrus may behave very savagely at times. They look to me like savage creatures.

The walrus is an important food-animal, as had been stated previously. The skin of young walrus is used for dog-harness and lashings, but the skin of the old walrus is used principally in covering permanent houses and in making dog-whips. The tusks are cut up into various parts of harpoons, *komatik* runners (not today, so much as formerly), various parts of the dog-harness, and so forth. Some of the Eskimos are very clever at carving little ornaments or figures of beasts and birds out of the ivory, and they sometimes make dice and other game-implements out of it.

Other Records: Seahorse Point was named by William Baffin in 1615 because of the great number of "morses" Bylot and his crew encountered in the ice-fields thereabouts (see Markham, 1881, p. 133).

Hearne (1795, p. 388) relates that while passing "Sea Horse Island" he and his party "saw such numbers of those animals [walrus] lying on the shore, that when some swivel guns loaded with ball were fired among them, the whole beach seemed to be in motion."

James Clark Ross (1835, p. xxi) recorded walruses from the northern part of Prince Regent Inlet. According to the same author they were unknown about Boothia, but abounded at Repulse Bay (*Ibid.*, p. xxii).

Rae (1850, p. 180) mentions seeing many walruses on a small island near Whale Island below Wager Inlet.

Preble (1902, pp. 69-70) says: "Occasionally found about the northern part of the Bay, to which section it is probably confined."

Low (1906, pp. 280-1) says, in a considerable discussion of the occurrence of these mammals in the northern waters: "They are very numerous in Fox Channel and Frozen Strait, where they are captured on the floating ice usually found in these localities throughout the summer." He mentions Walrus Island in Fisher Strait as a favorite rendezvous for the animals.

Soper (1928, pp. 48-49) gives us a brief discussion of the walrus in the waters about Baffin Island, and tells us that they are "tolerably numerous . . . in Roe's Welcome."

Mathiassen (1931, p. 27) says: "There are still large numbers of *walruses* in the waters south of the Island, in Duke of York Bay, and in places along the west coast. In September, 1922, I saw 25 walruses on an ice-floe near Cape Middleton."

Order **RODENTIA**.

Family **SCIURIDÆ**.

Genus **Spermophilus** Cuvier.

Spermophilus parryi parryi (Richardson). HUDSON BAY SPERMOPHILE.

Eskimo Name: *Shik-shik*, an onomatopoetic word.

Status: Since I heard so many stories about this interesting little animal among the Aivilikmiut, I fully expected to see one of them somewhere on Southampton. The species does not, however, seem to occur there, though it is apparently regularly common about Repulse Bay.

Captain Comer, in a personal letter, writes most interestingly of the *Shik-shik*. He says: "The natives of Southampton Island, the Saglernmiut, apparently were not acquainted with the Ground squirrel, for my natives, Aivilikmiut from Repulse Bay, would tell with much glee how, when the Southampton natives made a visit to the main-land and met the natives, they inquired what were those things which sat up and chattered *ter-ter-ter*. They had thought that these were the Tonwalks, or guardian spirits of the natives, they had come

to visit. To me they looked something like a woodchuck. I take it from this story that this animal did not live on Southampton. The native name sounds like *Sic Sic*."

I saw many of these *Shik-shik* about Chesterfield Inlet during the late summer and fall of 1930, and procured one specimen, which had been found dead, I believe.

This *Spermophile*, then, like the *Wolverene*, the *Shrew*, and the *Musk-ox*, must have extended its range into the *Repulse Bay* country or into *Melville Peninsula* after the insularity of *Southampton* was established.

Family MURIDÆ.

Genus LEMMUS Link.

10. *Lemmus trimucronatus* (Richardson). BACK'S LEMMING.

Eskimo Name: *Uhvinguk*, as likewise *Richardson's Lemming*, which see for discussion of meaning.

Status: *Back's Lemming*, like *Richardson's Lemming*, is subject to periods of abundance and rarity, probably throughout its range. *Soper* (1928, p. 51) has suggested that "perhaps the periods of abundance of the two species¹⁸ alternate." As a rule *Back's Lemming* is common on *Southampton*. It is to be found over the entire *Island*, especially in the flatter, western part, and less frequently in the high country along *Fox Channel* and in the vicinity of *Duke of York Bay* and *Seahorse Point*. *Soper* evidently regards it as one of the commonest mammals of *Baffin Island*, but he calls attention to the fact that it is somewhat local in distribution there, occurring frequently in what he calls "colonies."

About *Southampton* it is to be found on most of the offshore islands¹⁹ and on all the islands in the lakes, as well as throughout the suitable country of the interior.

Unlike *Dicrostonyx*, *Lemmus* does not greatly change in appearance during the course of the year. It is virtually of the same shade of brown both in summer and in winter. It resembles *Dicrostonyx* in many ways, living upon much the same sort of food, having the same natural enemies, giving birth to its young at any season of the year, never hibernating, and making its burrows and its nests of grass under the snow in winter.

Records: An extended discussion of some of the inter-relationships between this form and *Dicrostonyx* appears in certain paragraphs under the latter species. During the late summer and autumn of 1929 I constantly wondered whether *Lemmus* occurred on *Southampton*, for the *Eskimos* told me that only one sort of *Uhvinguk* was to be found, and they averred that this *Uhvinguk* became white in winter. My field-notes regarding the two species at this time of the year are not without considerable confusion on this account. I now know, of course, that many of the lemming-trails I noted in the grassy or marshy country were undoubtedly of *Lemmus* and not of *Dicrostonyx*, for the latter species, especially in summer, is decidedly partial to the higher, rockier country of the plateaus and ridges. The summer range of *Lemmus* is, on the whole, the lowest country the animal can find. The trails frequently lead through the grass of very wet country and cross pools in such a way as to suggest that the animals are to an extent partially aquatic. *Soper* (p. 52) too has called attention to this characteristic of the animal, as he noted it on *Baffin Island*.

In the region of *Four Rivers*, west of *South Bay*, the low country back from the coast,

¹⁸*Soper* is referring here to the species found on *Baffin Island*, *Dicrostonyx grænlædicus* and *Lemmus trimucronatus*.

¹⁹I am not sure that any small mammal occurs regularly on *Walrus Island*.

and at the edge of the extensive marshes was honeycombed with the burrows of what I now feel sure were burrows of *Lemmus*. The trails from burrow to burrow often led through swampy country, and even, sometimes, apparently across small streams. At the entrances of the burrows there were usually little piles of sand or silt. We frequently saw lemmings running about at a distance, and most of these were, I think, of the present species. The stomach of nearly every jaeger I killed in this region contained the remains of lemmings, and these remains were, without exception, of the present species. On August 28 I examined the stomachs of three Long-tailed Jaegers, and all these held the remains of *Lemmus*.

At Cape Low signs of *Lemmus* were to be noted everywhere. The trails interlaced all the flat country a short way back from the coast, and in the short grass were to be seen innumerable small, globular nests which probably had been built under the winter drifts. On September 3 Amaulik Audlanat saw many lemmings, as he walked about; and I found the remains of a *Lemmus* in the stomach of a Pomarine Jaeger.

During early September, after the first light snow falls, I saw a few trails which I now believe to have been *Lemmus*-trails. The footprints in these trails were not so broad and bear-like as in *Dicrostonyx*-trails, noted later in the season, but they were larger and broader than would be imagined after examining the slender foot of *Lemmus*. As a rule the trails were of the usual sort left by a walking or trotting animal; but sometimes they were in pairs, indicating that the animal had progressed weasel-wise in a series of jumps or bounds; and sometimes they were in groups of four, as if the animal had bounded up from one point and landed in another, ready for the next spring.

In the region of Seahorse Point *Lemmus* probably is not common, for we did not actually see it there. But the low meadows between the ridges and back from the coast appeared to me to be suited to its needs, and it probably would have been found in little colonies, had we had the time to trap extensively.

During November I spent a good deal of time setting traps under the snow for lemmings. I finally learned that raisins as bait attracted both *Dicrostonyx* and *Lemmus* and that it was possible to catch either species in any sort of burrow under the snow. By carefully noting the trails leading to nests and by observing the behavior of individuals kept in captivity I finally decided that while both species assuredly do go about in each others' burrows, the two do not dig the same sort of burrow. All burrows made along the ground through the grass, where the snow is easily broken up with a few movements of the front feet, are made by *Lemmus*. Burrows dug in the firm heart of the drift, however, are dug with the efficient claws of *Dicrostonyx*. Whether the two species always get on amicably together, or not, I cannot say. I never witnessed an attempt on the part of one species to drive the other out of its burrows; nor did I find the remains of one species, which had been killed and eaten by the other. I did, however, determine that if *Lemmus* bodies were not promptly removed from the traps, other lemmings, I do not know which species, sometimes destroyed and perhaps ate them.

I caught my first *Lemmus* in a large drift at the edge of a low meadow not far from the Post. The animal had not been attracted by the bait I had used, but had merely run across the trap. It was a male in very handsome chestnut-brown pelage.

On December 21 I caught an adult female, which also had merely run across the trap. One hind-leg of this specimen was abnormal; it had no claws and appeared to be somewhat tumorous. The pelage likewise, was not what I had expected. In the middle of the back there appeared to be a diamond-shaped area of color darker than the rest, which, I think, may have been a remnant of the summer coat.

The skin of these little mammals was very delicate, especially in the region of the legs; it was much more delicate than in *Dicrostonyx*. I also discovered that I could not pull the vertebræ of the tail out by a deft movement, but that I had to slit the tail on the under side and take the vertebræ out with a forceps.

During early January, 1930, I caught a good many *Lemmus* in the meadows north of the Post. They were most numerous in places, which had been swampy during the summer, and they were often abundant in places where the grass was deep, and the snow consequently not very firmly packed down. On January 11 I caught three specimens, two adult females and a young male.

On January 15 I noted several *Lemmus*-trails, and followed one or two of them for some time. I was surprised at the way in which the trails led directly across great open stretches on lakes. The animals evidently had started to burrow into the snow here and there in the meadowy country, but had decided to go on. I wondered whether, in the event a wandering mouse comes to a drift, the mice inside the drift make any sort of signal to the newcomer, bidding him to go, or to stay.

On January 16 I caught five specimens, one a young gray-colored male; one a female with four well developed embryos. The nest of the latter animal, which was not far from the place where I caught it, was a small ball of grass, about seven inches in diameter, placed under snow about eighteen inches deep, on the ground, among the grass. It was lined with finely shredded grasses and with a little fur, perhaps taken by the female from her own body. Leading to this nest were several burrows, all of which followed the ground and not one of which went up through the drift. In this particular region there were very few *Dicrostonyx*.

On January 18 I caught four males, one young, and dull colored. The testes of all the adults were swollen, much as if the breeding season were at its height. On January 20 I caught three specimens, an adult male and two immature individuals; and I examined the digging of a fox which led me directly to a nest in the grass under snow about fifteen inches deep. On the following day I found another nest in an open, marshy prairie under snow about twenty-two inches deep, placed between two fair-sized stones. Here I caught two sub-adults and two adults, one a female with three embryos about the size of peas. I found several nests among the deep grass; but most of these nests appeared to be unoccupied.

On January 22 I caught a sub-adult male and a half-grown female in an open meadow. On the following day I caught an adult female, which must have been nursing young. On January 31 Noah brought me a large female, which he had caught in the region of Darkness Lake. In this specimen were four embryos, all of about the same size, and measuring about 14 mm. without being stretched out to fullest length. Jack Ford upon seeing these told me that he had found a great many lemming nests in summer and that the broods he had counted nearly always were larger, consisting of six or seven young. He had not known that the young of this little mammal were regularly born in mid-winter, at the period of the lowest temperatures of the year.

On February 9 I found an adult male dead in the middle of a frozen lake, its fur clinging to the snow and ice, and small drops of frozen blood on its face and whiskers. I have no idea what caused its death. On February 13 and 15 I caught females both of which held four rather large-sized embryos. At this time young animals of all sizes were to be found in the traps nearly every day. It appeared to me that broods of young must have been appearing all through the winter.

On March 7 three specimens were caught, one a large-sized female with three embryos about the size of large peas. During March several *Lemmus* got away from the traps, leav-

ing a foot or some toes behind them. I think they twisted themselves off, rather than gnawed, their way to freedom. On March 18 a female with three very small embryos was captured.

On March 20 six specimens were caught, three of the females being gravid. The smallest of these females held four small embryos; the largest held three large-sized embryos, almost ready to be born. One animal had had all the fur of one side torn off by other mice. All over the body were the marks of tiny sharp incisors. I think the fur had been carried off for lining some of the nests in the drift.

On March 21 several more specimens were captured, among them a female with four small embryos about the size of BB shot. On March 27 a female with five large embryos was taken, and an exceptionally large male. At about this time I noted that the male *Lemmus* had noticeable subcutaneous glands in the region of the throat, which I suppose must in some way have accompanied the mating period. Most of the full-grown males had these glands. They were rather difficult to remove from the skin. Most adult females taken at this time held embryos, some of them three, others four, and a few five.

On April 11 I found an adult male dead. This individual apparently had some sort of skin disease; one ear was scabby, and the tail, back, and rump were not in good condition. The sexual organs appeared to be normal, and the stomach and intestines were full of partly digested food.

On June 11 several were seen, and a few were killed while the winter supply of bags of coal at the Post was being moved. Many of the animals seen were apparently young. On June 13 I watched one for a time, and heard it scolding me from the entrance to its burrow.

On June 15 Back's Lemmings were to be seen running about everywhere. When cornered, they were more savage than *Dicrostonyx*. They would stand up and squeal and threaten to bite, or even actually bite. During most of the summer we continued to find dead ones all about the tundra, many of them floating in the small lakes, where probably they had drowned.

With the coming of summer many of the nests of winter became exposed; and everywhere in the swampy country, where the animals had been especially abundant during the winter, were to be seen piles of excrement, sometimes actually quarts of it, along the trodden-down runways. I noted that many of these piles of faeces were frequently to be seen on or near plants of the Curlew-berry. The trails led here and there through the grass, and under the partly frozen turf.

The statement has been made in the present paper that the young of this species are born at any time of the year; I firmly believe this to be the case. This means, of course, that at the time of the melting down of the snow, many nests are exposed to the ravages of the little beast's numerous natural enemies, and many broods of young doubtless are drowned in the spring freshets and floods.

Soper (1928, p. 50) tells us of a female taken July 4 on Baffin Island "carrying nine embryos about ready for birth." I never took a specimen with so large a number of embryos, nor did I find a nest with so many young. If, as Soper suggests, the young are born in Baffin Island "in early July" and not throughout the winter, then perhaps it is necessary that the lemmings in that region have a larger brood all at one time in order to maintain the race in the face of its many natural enemies.

Annual Cycle of Activities. Some authors have commented upon differences in the pelage of this species in summer and winter. While winter specimens do at times appear to be brighter than summer specimens, a comparison of a large series shows that there is really

but little variation among them. The younger animals are assuredly duller and the fur somewhat glossier.

The entire life-cycle of Back's Lemming is spent in the meadows and marshlands, where it runs about among the tall grass feeding upon seeds, grasses, and various other vegetable matter.

The nests, which are globular, and considerably smaller than nests of Richardson's Lemming, at least in winter, are made almost altogether of grasses, lined with finer grasses, and with fur from the bodies of the lemmings themselves.

Taxonomic Remarks: Moulting and Color Change in Lemmus.

A large series of ninety specimens at once show how little variation occurs in adults of this species throughout the year. C. M. No. 6553 ♀ adult, Feb. 9, 1930, and No. 6686 ♂ adult, June 11, 1930, are identical in color and pattern, save that the winter specimen has the longer fur. There are no other discernible differences.

Two December specimens, 6475 and 6480, show a small patch on the middle of the dorsum where the longer fur of the winter has not made its appearance. These are the only specimens that exhibit any sign of the moulting.

Three adult January 16 specimens are colored as follows: Hair everywhere slaty black at base. Anterior part of back mouse-gray, the hairs tipped with blackish, passing into bright hazel caudad, the rump gray. Cheeks and underparts cream-buff, the chin, throat, and legs gray. In immature specimens taken at this season the color is a general gray above, hairs tipped with buffy, the underparts being paler.

Summer specimens have the rump a rich chestnut, otherwise similar in coloration to the winter specimens.

Skull Measurements of *Lemmus trimucronatus*.

MALES

Carnegie Mus. No.	Greatest Length	Basal Length	Palatal Length	Nasals Med.	Zygo. Brdth.	Intero. Brdth.	Mast. Brdth.	Upper Molar Row Alveo.	Lower Molar Row Alveo.
6475	29	26.6	16.9	8.3	19	4.1	13.7	8.2	7.2
6491	26.4	24	14.1	7.3	17.6	4	13	8	7
6501	30.4	27.9	17	8.7	...	4	14.1	8	7.4
6552	31.6	...	...	8.7	...	4.1	14	8.2	8
6560 imm.	25.4	22.5	14.4	7.2	16	4	13	7.2	6.9
6601	28.4	26	15.4	8.1	18.5	4	13.9	8	7.5
6607	29.8	27.4	15.5	7.8	19.1	4	14	8.8	7.6
6625	29.1	26.6	16.1	8.7	19	4	13.8	8	7.3
6630	31.3	28.7	17	8.6	20.1	4.3	14	9	8.3
6638	29.6	...	17.2	8.4	20	4	14	8	7.6
6643	28.7	25.7	15.4	8	18.7	4	13.6	8	7.4

FEMALES

6624	29.1	27	16.7	8.8	19.6	4	14	9.2	7.5
6557	28	25.6	15.7	8	...	4	14	8	7.8
6582	26.1	24	14.8	7.7	17.9	4	13.3	8	7.6
6604	27.9	25	15.4	8.1	18.1	4	14	8.1	7.7
6616	28.4	25.6	15.4	8.1	18.4	4	14	8.6	7.5
6621	28.5	26	16.3	8.8	19	4	14	8.4	7.4
6624	31.7	29.2	18	9	21.2	4	14.6	9.5	8.2
6629	29	27	17	8.9	20	4	14.2	8.7	7.9
6646	29.8	27.1	17	9	21.1	4	14.6	8.1	7.4
6651	28.9	26.5	16.2	8.4	19.1	4	14	8.3	7.8
6659	28.4	26.4	16.1	8	19	4	13.8	8.1	7.6

Stone (1900) has described the color changes and phases in *Lemmus trimucronatus* in much detail, having had at his disposal six hundred skins. These were specimens from Point

Barrow. He considers them month by month, so it seems hardly necessary to repeat the same for the animals from Southampton Island. Indeed, the specimens agree essentially in color with those described by this writer.

Cther Records: *Arvicola trimucronatus* was recorded from Igloodik, Melville Peninsula, by Richardson (1825, p. 311) and was said by James Clark Ross (1835, p. xiv) to be common on the shores of Boothia Felix.

Kumlien (1879) apparently did not find nor record the species at Cumberland Sound in 1877-78.

Preble (1902, pp. 54-55) found the species only at the mouth of the Thlewiaza River (a considerable distance north of the mouth of the Churchill River, along the west coast of Hudson Bay), but gives us nevertheless a very interesting discussion of the animal as he found it at this place. He took a series of about seventy specimens, from August 4 to 8. His statement "The breeding season seemed to be nearly over" leaves us with the impression that the animal did not breed throughout the year in that region. If, indeed, it does not do so, it markedly differs in this respect from the Southampton animal.

Low (1906) makes no mention of either species of lemming.

Allen and Copeland (1924, pp. 8-9) state that the MacMillan expedition secured several specimens of *trimucronatus* at Bowdoin Harbor and along the west coast of Baffin Island north of Latitude 65°N.

Soper (1928, pp. 49-55) says that this species "at times is more abundant than any other land mammal of Baffin Island." He gives us an extended discussion of the distribution and activities of the creature.

Mathiassen (1931, p. 27) merely says that "lemmings" are abundant on Southampton Island.

Mr. Ford was certain that he had noted this mouse as common since his coming to Southampton in 1924; he was not certain, however, that he had seen it on Coats Island.

Genus DICROSTONYX Gloger.

11. *Dicrostonyx rubricatus richardsoni* (Merriam). RICHARDSON'S LEMMING.

(Plate IX, figs. 1, 2; Plate X, figs. 1-8)

Eskimo Name: All the Southampton Eskimos called both species of lemmings *Uhvinguk*. The same name is in use on Baffin Island according to Soper (1928, pp. 49 and 55) though he spells it differently, giving us "*Awingak*, *Amilto*;²⁰ *Avingak*, according to Hantzsch." I made some inquiry as to the meaning of the word *Uhvinguk*, and learned that it is applied also to the human scrotum and to some extent also to any small bag. The Eskimos, with whom I had contact, did not give separate names to the two species of lemmings, and probably considered them as one species perhaps different ages, seasons, or pelages. This is not to be wondered at, for the Eskimos have little occasion for observing these unimportant mammals; and furthermore the two species live in the same burrows during the winter; and probably for this reason, according to Eskimo standards and concepts of behavior, are regarded as related.

Status: In the region at the head of South Bay, the Collared Lemming and the Back Lemming lived during the winter in exactly the same country, so far as I could determine. In the summer, however, the former species tended to live principally among the rocks along the ridges and in the somewhat higher country, while the latter was to be found almost

²⁰I never heard this word on Southampton Island.

altogether in the prairies and in the flat country between the ridges. So far as I could determine, both species were to be found all over the Island, though it is my belief that the Collared Lemming is somewhat more characteristic of the higher eastern part and the Back Lemming of the flatter western part. Both species are subject to cycles of abundance and rarity. According to the Eskimos there are some years when very few *Uhwinguk* of any sort are to be found; and during these years, as has been noted elsewhere in the present paper, other mammals are also likely to be rare, for the lemmings are the principal food of the Arctic Fox, and when the lemmings disappear, the foxes also disappear.

Judging from remarks made by the Eskimos at various times, I am of the belief that seasons when lemmings are very scarce on Southampton are indeed unusual; for the Eskimos told me that they practically always were able to catch plenty of foxes during the winter, and, when foxes are to be found, it is almost certain that lemmings also are present. The records of the Hudson's Bay Company tend to bear out this report, for the supply of foxes from Southampton has been fairly constant every year since the establishment there of the Post; so constant, in fact, that I have heard more than once that Southampton Island is considered the best fox country in the American Arctic.

The abundance of *Dicrostonyx* on Southampton Island is indeed interesting in view of Soper's statement (1928, p. 55) that "this species is comparatively rare on Baffin Island and occurs only locally."²¹

Records: For a long time I was greatly confused in my study of the lemmings, for I was not sure that there were two species present on the Island, and furthermore I was repeatedly assured by the Eskimos that there was but one. I saw signs of lemmings practically every day during the late summer and fall of 1929, and now and then actually saw or heard an animal, but I was not sure which species I was encountering, and I was so preoccupied by my study of the migration of birds, that I did not spend as much time, as I might have, with the mammals. My notes covering this period are not very satisfactory. However, knowing what I now know about the two species and their interesting relationships, I can edit my field-notes intelligently and glean a few data worth recording here. *Dicrostonyx*, in its summer pelage, was met with all along the southern shore of Southampton, on the trip to Cape Low, and again on the trip to Seahorse Point. I am convinced that it was commoner in the eastern than in the western part; not alone because the only specimens actually caught were taken in the eastern part, but because most of the remains of lemmings taken from stomachs of the jaegers in the western part were of *Lemmus*, and not of *Dicrostonyx*. *Dicrostonyx* is not in fact, a creature of the meadows; it is an animal which likes to live along the ridges. This characteristic led me in all my notes to refer to it as the *Rock Lemming*, as differentiated from the *Meadow Lemming*. *Dicrostonyx* was found wherever there were ridges, heaps of stones, or extensive gravel-mounds. At Four Rivers on August 27 I noted extensive lemming-burrows all along the gravel-ridges and saw at least one *Dicrostonyx* there, though the jaegers collected at that point had been eating only *Lemmus* as shown by the contents of their stomachs.

At Cape Low, *Dicrostonyx* was rare. The country thereabouts was very flat and the only rocky places were along the shore. I noted many burrows and quantities of old winter nests among the moss and grass, but I think that most or all of these were of *Lemmus*. The remains of Lemmings found in stomachs of the jaegers were all of *Lemmus*. Amaulik Audlanat told me, however, that he had seen a *gray Uhwinguk*, and this lemming could hardly

²¹It has occurred to me that Soper may not have encountered a "good season" for mice during the years he worked on Baffin Land.

have been *Lemmus*, for *Lemmus* usually gives the impression of being brown rather than gray.

On September 12 at the Post I noted the first trail in the snow of this interesting little mammal, and did not wonder that the Eskimos sometimes referred to it as "little Nanook," i.e., "little Polar Bear," for the tracks were broad, almost round in fact, and the spacing such as to immediately suggest a tiny bear of some sort. On the following day I saw more trails and heard one chuckle as it dived to safety under a huge boulder. On September 14 I saw several sitting on the tops of boulders apparently sunning themselves.

On September 21 near Leyson Point Jack Ford and Kyakjuak each caught a lemming by digging up burrows along the sandy margin of a stream. Both these proved to be *Dicrostonyx* in full-summer pelage. Unfortunately²² these specimens were crushed underfoot on the boat during the excitement of shooting some Old-squaw Ducks. On September 25, I found the remains of a *Dicrostonyx* in the stomach of a young Duck Hawk.

On October 4 at the Post I saw "Bobby," one of the younger Husky dogs, catch and bolt a lemming not far from the house. During early October I noted trails of lemmings nearly everyday, and observed that the relatively broad footprints of the present species were to be found nearly always about the high boulders, or among the ridges. The first definite evidence of change of pelage I obtained from the remains of one taken from the stomach of a White Gyrfalcon on October 15. In this specimen most of the hair was whitish terminally, dull grayish basally. By the end of October I had dug out so many burrows and had tried so hard to catch one of the creatures that I began to wonder if I ever should be able to procure a series showing anything of the change in pelage. By this time, of course, birds were not very common anywhere, and I spent more time in studying the mammals. On October 30 I spent virtually the whole day razing a big snow-bank. I followed innumerable burrows which led everywhere through the drift, sometimes along the rocks, sometimes several feet from the ground through the very heart of the snow-bank.

During November I saw *Dicrostonyx* trails every day in the vicinity of the Post and at East Bay. I continued to wonder whether there could be two species of lemmings, for I have not yet caught a *Lemmus* and since I saw no trails in the snow save those of the broad-footed *Dicrostonyx* I naturally concluded that there must be but one form. On November 9 I noted many trails in fresh snow, and observed that the long hairs on the feet (or perhaps the long digging claws) left an imprint in the snow much as if the creature had been holding a little wisp of straw or something of that sort in each foot (see illustration). On November 12 I noted that the drifting wind continued to open and lay bare burrows everywhere along the shallower drifts. Here it was possible to follow the burrows for long distances with ease, and I noted piles of droppings, patches of urine, and little heaps of shredded grasses here and there all along the tunnels. On November 18 while setting a fox-trap, I happened to expose a network of burrows, all of which obviously were inhabited, and I decided to try setting traps for the creatures at this place.

The capture of my first winter *Dicrostonyx* required hours of labor. I decided at first that these animals would be likely to be found only in the biggest snow-banks so I tackled such a bank not far from the Post. I dug with a shovel until I had an excavation eight feet long, four feet wide and about seven feet deep—and several blisters on my hands. With all this digging I exposed but a few tunnels. Using bread, cheese, and frozen potato as bait, I set ordinary spring mouse-traps along the widened portions of the burrows, and sealed

²²It is a matter of great regret that I failed to note the condition of the claws of the front feet in these mid-summer specimens.

these little chambers shut with great slabs of snow. Hopefully I returned the following day, only to find that my excavations had drifted shut during the night. After digging most of the day once more, I found about half of the traps I had set, and was encouraged by noting that mice had evidently run *about* the traps, perhaps sniffing at the unfamiliar objects. But I caught no mice. The Eskimos were much amused at my eagerness to catch a lowly *Uhvinguk*. But they offered no assistance in solving the problem. Day after day I went on digging in the drifts, setting my traps, and returning without any reward for my efforts.

On November 20 I decided that the foxes must succeed in digging out lemming-nests without much trouble, for I found many such diggings where nests were strewn about on the snow. On the trip to East Bay, I noted a few lemming-trails, and examined a few burrows which were exposed during the course of the construction of our *igloos*, but I caught no lemming.

When I again returned to the Post, I set to work in earnest. I set and carefully marked about forty traps. I excavated in all sorts of places, for the most part *not* in the deepest drifts. On December 11 one of the traps was sprung. On December 13 I at last caught a lemming and it proved to be *Lemmus*. I had to control myself a little when I bore the creature home and showed the Eskimos that, as I had expected, it was different from the *Uhvinguk* with the big digging claws. All the Eskimos nodded their heads sagely.

On December 21 I caught another *Lemmus*, but the animal had merely run across the trap. I decided that I was using the wrong bait. Once I began using raisins instead of bread, cheese and potatoes, I began to catch lemmings, and I soon found that wherever I set my traps I might capture either *Lemmus* or *Dicrostonyx*. On December 31 I caught my first white *Dicrostonyx* in a burrow near the Post dwelling; the animal had started to eat the raisin. This specimen was in complete winter-pelage.

At about this time, I noted that many of the weasel trails led into and about the lemming burrows. By watching the weasel trails I frequently discovered drifts where lemmings were abundant, and learned to set my traps accordingly.

On January 2 one of the Eskimos called to me, saying that he had heard a lemming drilling in the snow. I went out, stood on the drift, and soon heard the sharp, burring noise, not far under the snow. After listening for a time, and determining that the burrows may at times be drilled with great rapidity especially if the snow is not too firmly packed, I dug down quickly, located three burrows, measured them, and set traps and sealed them in. The burrows were among the largest I encountered. They measured fully three inches in diameter. They were a trifle broader than high.

On January 7 I caught a large female (no embryos) at this burrow. The animal was alive in the trap and had dragged it about four feet through the burrow in spite of the fact that it had been fastened with a copper wire and large nail. The lemming did not grit its teeth or try to bite when I took it from the burrow.

On January 11 I caught both a male and female at another burrow. Both were in very white pelage. The stomachs of both were full. From this time on, I had no difficulty in catching *Dicrostonyx*; my troubles now centered in determining to what extent this species and *Lemmus* fraternized during the winter-months.

On January 22 I caught a rather under-sized and decidedly gray female, probably an immature animal. On January 24 I caught a young male and an adult female in the same burrow. On January 25 I caught five specimens, which showed a remarkable range in size and coloration, one very large female with a decided brown, gray, and buffy markings, not noted in any winter specimens captured heretofore. On January 26 I caught a very large

female with swollen mammae which was evidently nursing young. And all these specimens were taken from burrows where *Lemmus* specimens also were being caught almost daily.

On January 27 Amaulik Audlanat brought me a specimen he had found dead on a cake of ice not far from Cape Kendall. This animal was in very poor condition and had evidently been swimming through salt-water. It was in full winter-pelage. On the same date I caught a half-grown female not far from the Post.

On January 28 I caught two adult females and noted that the traps were being pulled up, anchor and all, and carried off through the burrows. I subsequently determined that *Lemmus* never succeeded in dragging traps away, but that *Dicrostonyx* frequently did so, when the trap was not properly fastened.

On January 29 one of the Eskimos brought me a nice specimen from Native Point, wrapped meticulously in three layers of heavy burlap. On this date I found my first winter *Dicrostonyx* nest. To my great surprise it was not placed under a rock, nor even on a ridge. It was in a relatively low, gently sloping drift along the side of a narrow meadow, perhaps thirty feet from the base of a ridge. The drift was about four feet deep. The nest was placed in the very middle of this drift about three feet from the surface and at least a foot from the ground, so that it was entirely surrounded by snow. The nest was made entirely of grass and was almost spherical, the lining consisted of the same sort of material as the outside, but was perhaps more finely shredded. The cavity in which the nest was placed was snugly packed, there being no empty space about the nest. Leading to the nest were three burrows; but these all led to one entrance; they did not lead through the nest and the nest had but one entrance. The nest and the burrows near the nest were very clean; there were but few feces anywhere about; in the burrows two feet away and in little chambers along the burrows, however, there were heaps of droppings and numerous urine-spots. The general appearance of the nest gave the impression that the animals were intentionally cleanly thereabouts. In the nest were three young. I did not see an adult animal. The young froze soon after I had exposed the nest.

The walls of the nest were perfectly dry; they were well packed, but were not in the least soggy; and they were about five inches thick, leaving an innermost chamber about three inches in diameter, in which the young lay.

On January 30 I caught two young, very gray, female specimens. On the same date Noah brought in two adult specimens, a male and female, from the region of Darkness Lake. The female had very noticeable ragged, almost bare patches on the sides of her flanks, which may have resulted from the clasping of the digging claws of the male during copulation.

I found on February 1 that in a certain small drift, where I had set many traps, the animals were spending much of their time in digging new burrows, apparently from the willow-bushes about which they had fed, to new clumps. My impression is that these animals do not as a rule girdle the shrubs upon which they feed. Assuredly they eat willow-buds and twigs, but, so far as I know, they do not actually destroy the plants. Whether there is some provision of nature, which prevents their doing so, is more than I can say. It is difficult to state just what is the most important winter-food of the animals. They live almost altogether on green plants, which they find beneath the snow; lichens, mosses, and so forth, and some seeds no doubt; and it is probable that upon occasion they are cannibalistic; but they somehow do not destroy the willow-plants. It is very unusual, indeed, to come upon a dead willow-shrub anywhere in this portion of the Arctic.

On February 4 Amaulik Audlanat caught a handsome male as it was running about on the snow in the region of Koodloutok River. The dogs scented this animal and almost caught

it. It was very fat. At about this time I noted that there were more trails than usual crossing the snow; I also noted the first, slender-footed *Lemmus* trails. These trails may have indicated either that certain burrows were becoming overcrowded, or that the food-supply was giving out.

I was much surprised to find the two species of lemmings inhabiting the same burrows. Whether they always do so, and whether they use the same burrows only in reaching other feeding- or nesting-grounds is more than I can say at present. I was given the impression, however, that the two species lived amicably together, and that they fed upon the same food, gave birth to their young similarly at almost any time of the year, and were in most phases of their life-history amazingly similar.

I think I can say with certainty, however, that burrows dug by *Lemmus* practically always follow the ground, and, as a rule, are dug through shallow, rather rough and not firmly packed snow, which has fallen in the meadow-country; and that burrows dug by *Dicrostonyx* are usually to be found in the deeper drifts, frequently penetrate any part of the drift, almost never follow the ground, and go through all sorts of layers of snow. Once the burrows are dug, both species apparently use them; but I think it likely that burrows *through* drifts are never made by *Lemmus*, for the claws of this species are not suited to such burrowing.

Furthermore *Lemmus*-nests are nearly always placed *on the ground*, often under rather a shallow drift; while nests of *Dicrostonyx* are placed in the middle of the drift, often at some distance from the ground. The same materials are used in the construction of nests in both species; the lining of *Lemmus*-nests often contain some fur; *Dicrostonyx*-nests usually do not.

On February 9 I followed several burrows and determined that faeces of the animals (which species I cannot say) are not dropped here and there as are those of the hare, but in little piles of from five to twenty droppings, as in *Microtus* often accompanied by a spot of urine.

On February 20 Mr. Ford caught a female which was running about on the snow. On being cornered the animal stood up on its hind legs to give battle.

I followed a trail for about two miles across the rough harbor ice on February 21. Here and there were diggings, as if the animal had tried to find soil, or rock, or food. At about this time many such long trails were to be seen, as if the animals were in search of new feeding- or nesting-territory.

On February 25 Jack Ford caught a female (no embryos) which ran across the trail in front of the dog-team and dug herself into the snow so rapidly that Jack had great difficulty in getting her at all.

On February 27 I caught a male which apparently had blundered into one of my fox-traps. On the same date an adult female was captured in a burrow. In this specimen were five embryos, about half an inch long. The coloration of this specimen interested me. Since, like other adult females taken in burrows, it had a somewhat blotched coloration, and since all animals caught running about on the snow were in *full* white pelage, I could not help wondering whether such white individuals were the only ones that ran about on the snow and the parti-colored ones (whether or not they were conscious of their coloration) stayed under the snow.

During March specimens in all sorts of pelage were taken. On March 2 an adult male in mottled pelage was taken. On March 7 a plain gray male was taken. On March 22 a very large female in "grizzly gray" pelage was captured. This individual had young. I do not

know whether she was just taking on her new summer-coat, or whether the gray represented the last of the pelage of the preceding summer.

On March 24 Shupunguk's wife brought in a specimen, which had been caught in an *igloo* at Munnimunnek. On March 27 I caught a silken white male in a meadow burrow, and also a decidedly small female with *two* embryos. This may have been a sub-adult animal with her first brood. On March 29 a female with five embryos (one considerably smaller than the others) was taken. On March 30 an adult female, almost plain gray in color and with five small embryos, and a youngish animal with a gray stripe down the middle of the back were taken.

On April 3 a female containing seven embryos was caught. On April 5 I found to my surprise that a specimen caught in a trap had been destroyed by other lemmings. Of course I had no way of knowing whether *Dicrostonyx* or *Lemmus* had done this; but judging from the fact that *Lemmus* nests sometimes contain hair as well as fine grass in the lining I decided that the *Lemmus* must have torn off the hair for nest-lining and then gone ahead in eating or at least chewing off some of the skin and frozen flesh.

During latter April we saw many *Dicrostonyx*-trails at the floe; but we saw no *Lemmus*-trails there. These trails frequently appeared to lead nowhere in particular; sometimes they led to patches of seaweed, where the animals evidently gnawed for a time. The Eskimos caught a *Dicrostonyx* in Muckik's *tupek* just south of Bear Island on May 1.

On May 5 a visiting Netchilik Eskimo woman caught a live *Dicrostonyx*, a sub-adult in somewhat changing pelage, in her partly constructed *igloo*. This animal she gave to me. I was much interested in the behavior of the creature. It ate crumbs and raisins from the hand a few moments after it had been caught, was very friendly in disposition, though it sometimes coughed or snuffed explosively when its vibrissae suddenly touched our hands, and acted as if it were about to bite. It tired easily, curled up almost anywhere, and went to sleep in the most offhand way, only to waken in a moment or two, to begin its endless wanderings about. As it ran on the floor, its big digging claws made an odd sound. It sometimes had a little difficulty making its way about, because these claws were clumsy. It was very curious when on my work-table. It tried to chew almost everything with which it came in contact, sneezed when it stuck its face into plaster of Paris or arsenic, stood on the edge of the table and leaned out as far as it could, sniffing, tore pieces of paper up hurriedly or splintered matches and rattled about over everything. We made it a nest of excelsior. Here it slept for a little while, then wakened and rattled about nervously, eating sporadically.

We put it on the snow and took some moving pictures of it. In digging it moved its front feet very rapidly, turning its body now this way, now that, kicking the loosened snow backward with its hind feet and thus sinking into the snow so rapidly that it disappeared in a twinkling, the loose snow filling in the burrow as it went forward and downward. It liked to bask in the sun. It was altogether fearless. When picked up by the skin of the neck it spread all its feet out comically. Sometimes it squealed or chuckled a little, and bit gently. It ate almost anything we ate, showing preference for jam, butter, sweetened coffee, and raisins. It died on May 9. Mr. Ford thought that it got into some pepper by mistake.

On May 10 Muckik caught an immature female in his *tupek* at the Bear Island floe. On May 12 Pumyook caught an immature male in his *tupek*. Both these specimens were decidedly gray, with a somewhat grizzled appearance, and with a noticeable median line down the back. Judging from the appearance of these specimens as well as of the three small young taken from the nest, I should say that the young animal, no matter at what time of

the year it is born, has a somewhat gray appearance, and that if it is born in mid-winter it does not have the white or gray-white winter coat of the adult until the following winter.

From May 19 to 21 Tommy Bruce and I noted several *Dicrostonyx* burrows in the region of Itiujak. On May 25 Muckik brought in to the Post two very grizzled adult male specimens, which he had caught at Bear Island. These, I should say, were in almost full summer-pelage. They had full-sized digging claws. On May 31 Noah found a very gray, grizzled, female specimen lying at the edge of the nest of a Snowy Owl. From this date on all *Dicrostonyx* seen or captured were in summer-pelage.

On June 5 I saw a Herring Gull catch a lemming along the edge of a meadow. I am not sure that it was *Dicrostonyx*.

On June 10 a very warm day, Richardson's Lemmings were to be seen everywhere. The snow was melting rapidly at this time, and the burrows were doubtless badly flooded. It was not unusual to see as many as twenty or thirty of the animals at one time, running this way and that, or sitting in close-set companies on the dry, protruding rocks. At about this time most of the predatory birds appeared to be living almost altogether on lemmings, for the little beasts were very easy to capture. The dogs at the Post ate quantities of them too, wandering all about the tundra snatching them up everywhere. On June 13, when Jack Ford and Santayana were eating their lunch along a little stream, they took from the water which flowed past them the bodies of thirty-two dead lemmings (most of them of the present species) which probably had been drowned in their burrows and were being carried out to sea.

On June 16 and 17 I continued to see vast numbers of *Dicrostonyx* everywhere I went. The animals apparently did not know where to go. When frightened they ran to the shelter of a rock, stood up and gritted their teeth. If cornered, they chuckled and squealed and bounced about in a peculiar way, hitting this way and that with their front feet and opening their mouths wide. On June 17 I found several dead ones along the margins of small streams, and others simply lying on the tundra. These, perhaps, had died in their burrows during the winter.

On July 5 I noted that the sandy or gravelly uplands were everywhere honeycombed with the burrows of lemmings. At the fresh diggings the ptarmigans were dusting themselves.

Some of the Eskimo children were so pleased with the appearance of my lemming skins that they began making collections of their own. Some of these skins were stuffed with grass; others were spread out in neat squares and tacked on boards. Little Ookpik, Amaulik Audlanat's daughter, worked diligently at skinning the lemmings she found, and she had the sides of her wooden bed at the Post literally covered with stretched skins.

On July 9 Tommy Bruce returned from Cape Kendall. He told us he had never in his life seen so many lemmings as there were near the Blue Goose colony. The mice congregated on the driest places of course, and since these same places were the best for the Eskimo encampment, it was necessary to kill hundreds of the animals, if they were to sleep in comfort anywhere thereabouts.

On July 14 fourteen dead lemmings were found heaped on top of four young Snow Buntings in the temporary den of a weasel. Most of these were young *Dicrostonyx*. There were a few *Lemmus*.

Annual Cycle of Activities: The young, which are born apparently at any time of the year, even in the dead of winter, probably number from two (in the case of young females with their first broods) to seven or eight. The summer-nest is placed at the end of a burrow, which

has been dug in a sandy or turfy place. The winter-burrow is made in the center of a snow-drift, not on the ground under the snow, as is the nest of the Back Lemming, but in the middle of the drift often several inches above the ground.

Winter-born young are decidedly whiter than young born in summer. They are not as white as adults in full winter-pelage, but they are very hoary in general appearance. Their claws are simple and apparently single-tipped at birth, but by time they are ready to leave the nest a lower process has appeared on the claw and they are ready for digging. This, it seems to me, is an amazing adaptation to environment. Unfortunately I did not preserve specimens taken throughout the year, so am not able to furnish absolute proof for my belief that in this form on Southampton Island the double digging claws of the adult are carried throughout the year.

The change of pelage from winter to summer is usually completed before the snows have disappeared. Specimens we took in early May were all in the summer-coat. The winter-coat is assumed with the coming of the first autumnal snows in some individuals; in others, the grizzled summer-colors are retained for some weeks, even months, so that even in the dead of winter, specimens may be taken in which there is a remarkable marbled appearance. Some such animals are so oddly colored that they present a most beautiful appearance. The moult takes place unevenly over the body, resulting in streakings and patchings, which are not bilaterally symmetrical.

According to the material I collected, breeding females are likely to be far slower in taking on the winter-pelage than are the males, or non-breeding females. On the other hand, those individuals, which are likely to wander widely above the snow and those which are without family ties, are nearly always very white in color.

Taxonomic Remarks: Merriam (1900) when describing this form, pointed out that the enamel-pattern of the teeth was as in *nelsoni* and *unalascensis*, not as in *hudsonius*. Recent writers have attempted to fix a relationship with *hudsonius*, but Allen (1919) in his monograph of the genus, has referred it to the Alaskan *rubricatus*, on the basis of studies of the interparietals and the two anterior cheek-teeth, these in *rubricatus* having each an additional postero-internal fold, which is uniformly lacking in *hudsonius*. There are further differential characters, but these are of an average nature and do not hold in all cases, when large series

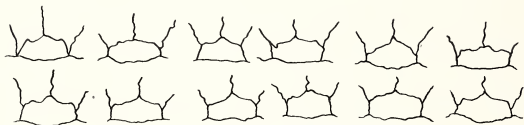


FIG. 1. Interparietals of *D. rubricatus richardsoni*.

are compared, as Allen has pointed out. We are inclined to agree with this latter view, but the series of specimens from Southampton Island, eighty-nine in all, show some of the skull-characteristics of *hudsonius* as outlined by Allen. For example, the interparietal bone of *D. rubricatus richardsoni*, as figured by Allen, is broad, with a bracket-shaped anterior outline, the prolongation of the parietals separating the interparietal from the squamosal. In the Southampton specimens, of seventy-seven skulls, only four exhibit an instance where the interparietals separate these other two bones, and in none of these is this division well marked (Text-figure 1). In the original description Merriam pointed out that the bullæ

were depressed, being broadly and roundly inflated. This is not so obvious in the large series from Southampton Island. The bullæ are not appreciably depressed.

Coloration and Moults. Winter: Adults: faded white above, darker on belly; bases of hair slate-black. Young: pale mouse-gray, brownish gray along dorsum; dusky dorsal stripe evident.

Summer: The upper surface of a specimen taken June 10 generally gray, with buffy hairs, with a prominent dusky streak through middle of back, but not extending over head. Belly lighter. Flanks, inguinal region, and most of belly cinnamon-buff, as is the ill-defined band across throat. Nose with short black median stripe, otherwise grizzled. Ears tawny olive. Back grizzled, the hairs tipped with ochraceous-buff; rump gray, with little buffy or brown coloration. Base of tail like rump, terminal portion and upper feet dirty white. Belly hairs ochraceous-buff, richer in the sternal region; inguinal region warm buff.

Moulting is very irregular in this form, and individuals taken from December to early May show some change of fur in progress. The change to the white winter-pelage must be rather sudden, if the captive, presumably of this species, that Ross describes, is any criterion. The animal was kept in a warm cabin of the vessel during the course of explorations for the Northwest Passage. The dark pelage was retained until February, when the lemming was exposed on the deck, with temperatures ranging to 30 degrees below zero. The white coat was completed in a week. Shortly afterwards the animal died from exposure.

An adult male taken December 31 has a grayish brown patch of fur over the shoulders, extending to the middle of the back. Apparently the lemming is coming into the winter-coat of white. A light brown wash suffuses the face, but the cheeks and rest of the head are white. Six adult specimens taken in January are white. Two immature males and a young female taken respectively on January 22, 24, and 25, are light mouse-gray above, tawny about the ears, with a distinct dorsal stripe. They are lighter below. A large female, captured January 26, has a broad pale brown patch on the middle of the dorsum, narrowing toward the rump. An adult male, captured January 31, is all white; but another female, collected the same day, is grayish brown, with a buffy tract across the dorsum, twenty-five millimeters wide, which likewise narrows toward the rump. The throat is buffy, richer than the dorsal stripe.

Most of the individuals taken in February are white. There are some striking exceptions, which show the progress of the spring-moult already well started. An adult male taken February 9, has a roughly triangular brownish patch on the crown, with a smaller similarly colored area just behind. A female taken February 10 has the moult well advanced. The predominant color is still that of the white winter-phase, but a large patch on the dorsum caudad from the shoulders, has been replaced by the shorter mouse-colored fur, as is also the case in the region of the face. Amongst this new hair a few long white hairs still persist. The sides are washed irregularly with ochraceous-buff; band across shoulders on venter deeper buff, more tawny. The tail and feet are white. A female taken February 27 is white, but for a large spot in the center of the back, which is dark brownish, tending to black.

Among the March adults a female, taken March 22, has the back nearly devoid of white, its place being taken by brown-tipped hairs, which approach a gray hue near the midline. The nose is mouse-gray. A female, captured March 26, appears to have more than half completed the moult. The large whitish hairs of winter still remain in isolated tufts along the side of the back and noticeably over the rump; ears and cheeks tawny; rest of back ruddy gray, interspersed with many brown hairs. Seven adults, obtained from March 28 to 31, are still in the winter-pelage.

A female taken April 3 is white on the dorsum, and is shedding along the flanks and belly, both being warm buff, with some gray hairs mixed in. A sub-adult male, still in winter-coat, has the prominent dusky dorsal stripe. Two males, captured April 8 and 21, are nearly identical in color. Both have lost all white along the back, but the flanks and underparts are nearly white, except about the inguinal region and flanks, which are stained sulphur. The dusky dorsal stripe is quite pronounced in these individuals. Top of head and cheeks, mouse-color, back cinnamon-buff, darker towards the middle.

An immature male and female, taken respectively on May 9 and 10, still exhibit the long winter-fur, while the underparts are dirty white; the backs grayish, with much brown throughout, except the ears, which are tawny. Three males, one collected on May 12, and two on May 25, are similarly colored. They have completed the change, and show no sign of moult, but are not as rich in color as June specimens. The upper parts gray, with much brown appearing, notably about the middle of the dorsum. The ears and shoulders rich brown, passing into buffy along the flanks. Belly lighter, with a pale brown wash. An immature male, taken May 31, is pale neutral gray, with little brown in the coat. Flanks and belly considerably paler.

As may be seen from text-figure 3, *Dicrostonyx* has four sets of mammae: two pairs pectoral, one post-abdominal, and one inguinal.

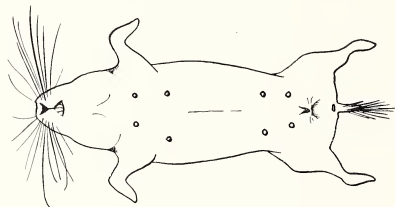


FIG. 3. Mastology of *Dicrostonyx* from alcoholic specimen taken June 1930, on Southampton Island

External Characters: Fore Feet. The highly modified fore-claws of *Dicrostonyx* have long been a source of considerable interest among zoölogists. Here we find seasonal changes, which are unequalled in any other Microtine. Generally the two middle claws become enormously enlarged and highly modified for a fossorial life in the snow, whereas the second and fifth claws, while large, do not attain to any unusual development. The thumb nail is minute. Commenting on this phenomenon, Coues says:

"The two middle fore claws attain their maximum development in winter. In spring and early summer these claws do not appear very different from those of *Myodes (Lemmus)* though averaging larger, more bulbous at base underneath, with the terminal portion slenderer, straighter and sharper. This bulbous portion underneath grows out simultaneously with increase in length and amount of curvature of the main portion of the claw, until it equals or even exceeds the length of the latter, and is quite as stout, or even stouter, being somewhat broad and pad-like. At this period it runs the whole length of the claw, from which it is separated by a groove along the sides, and by a notch at the end, both of varying depth. The claw then looks nearly like two claws, one underneath the other. The pad would then seem to gradually sever its connection with the main claw by progressive increase in depth of the constriction marked by the lateral groove and terminal notch as well as by

loosening from the base, when it appears like an excrescence; it is finally lost. Thus the process appears to be a periodical one, like the shedding of the horns of ruminants, and not continually progressive with age; and would seem to be connected with the particularly



FIG. 2. Middle fore claws
of *Dicrostonyx*. X 2

fossorial habits of the quasi-hibernating animal that digs galleries under ground in which to reside during the cold season, as compared to its freer and more active mode of life during the summer. At the period of maximum development of the claws these equal or surpass half an inch in length."

In a series of *D. hudsonius* from Belcher Island, Hudson Bay, Allen found the enlarged fore claws of a specimen taken April 5 to have disappeared. An adult from Great Whale River, Hudson Bay, taken April 20, still retains the enlarged fore-claws. In a specimen from the Nastapoka River, collected May 8, the enlarged fore-claws are nearly ready to fall away.

Dicrostonyx unalascentis steebersoni, an insular race restricted to Umnak Island, Alaska, never acquires the enlarged claws. Nelson (1929) writing of this species, says:

"This species apparently does not take on the white winter-pelage, and lacks the great winter development of the two middle claws on the fore feet so conspicuous in other species of the genus. . . . The retention of a brown pelage in winter by the Umnak lemming . . . may be reasonably attributed to the response of this species to the milder winter climate of its habitat. While Umnak Island lies in a very stormy region, yet zero temperatures are uncommon, and while snow falls at intervals during more than six months each year, sometimes remaining on the ground for weeks, yet not infrequently during the winter months the ground lies nearly or quite bare."

We find in the lot of *Dicrostonyx* from Southampton that all adults have these enlarged claws with the exception of a single female taken in mid-July. Specimens collected in June, as well as an adult male taken in July, have enlarged claws. Furthermore, there is no indication of the claws in the process of shedding. May it not be logical to reason that this form, snowbound from early September until well into June, for the most part does not undergo seasonal changes, but in most instances, when the modified claws have finally appeared at an early age, are retained throughout life. The young are born without the modified condition; but this modification becomes apparent in young born in winter and spring at a very early age.

Other Records: Preble (1902, p. 58) tells us that "this lemming has been several times recorded from this region, usually under the name *Arvicola hudsonius*."

W. E. Parry's party took specimens on Melville Island on June 13, 1920, which were "turning brown" (see Parry, 1821, p. 202).

Lyon (1824, p. 47) recorded this lemming from the region of Duke of York Bay, Southampton Island.

Skull Measurements of *Dicrostonyx rubricatus richardsoni* from Southampton Island.

MALES

Carnegie Mus. No.	Greatest Length	Basal Length	Palatal Length	Nasals medially	Zygom. Breadth	Interpal. Breadth	Mast. Breadth	Upper Molar Row Alveol.	Lower Molar Row Alveol.
6536 imm.	26	23	15.1	7.9	17.6	4	12.7	7.2	7
6548	29	26.6	17	8	20.1	4.4	14	7.8	6.9
6554	28.5	27	16.4	8.1	20	4.2	14.1	7.1	7
6563	28.3	.....	16.1	8.1	19.4	4	13.6	7.4	7
6580	29.9	26.7	16.5	8	19	4.4	14.1	7.8	7.1
6589 imm.	26.8	24.7	15.7	8	17.9	4	13.4	7.7	7.1
6590	30	27	17.7	9	21.2	4.3	14.8	8.7	7.9
6596	30	26.4	16.6	8	20	4.5	14	7.6	7.2
6662 imm.	26	23.1	13.9	7.4	17.4	3.9	13.3	7.1	7
6665	27.9	26.1	15.9	7.8	19	4	13.9	7.3	7.1
6672 imm.	27	25.9	15	7.9	.....	3.9	13.4	7.8	7
6683	28.6	26	15.6	8.2	19.1	4.4	14.2	7.8	7.3
Averages for 8 ad.	29.1	26.5	16.5	8.2	19.9	4.3	14.1	7.6	7.3

FEMALES

6526	29.2	27.7	16.1	8.3	20.4	4.2	14.1	7.9	7.1
6527 imm.	26.1	23.2	14.8	6.7	17	.....	13.3	6.9	6.7
6541	28.9	27.5	16.2	8.2	20.3	4.3	14.1	7.8	6.9
6530	27.5	25	15.7	7.9	18.9	4	14	7.5	7.1
6551	28.8	26.5	16.1	8.6	19.8	4.3	13.8	7.3	7
6556	27.1	24	15.5	7.2	18	4	13	7.6	7
6573	28.1	25.1	15.7	7.9	18.7	3.9	13.4	7.1	7
6562	28.9	26.4	16.1	8.4	19.9	4.1	13.7	7.4	7
6622	30.3	28.9	17.5	8.9	21.6	4	14.4	7.9	7.6
6649	30	27.5	16.8	8	19.8	4	14.3	8.1	7.7
6653	31.1	28.4	17.2	9	.....	4.8	14.9	7.9	7.5
6682	28	25.2	15.5	8	18.4	4	14	7	6.3
Averages for 12	28.7	26.3	16.1	8.1	19.3	4.1	14	7.5	7.1

James Clark Ross (1824, p. 93, Appendix) reported it from Port Bowen, Prince Regent Inlet, and obtained specimens from Boothia Felix (1835, p. xiv) where, he informs us, it was active throughout the winter.

Richardson (1829, p. 132) tells us that it is to be found throughout Melville Peninsula. Rae (1888, p. 144) states that lemmings (probably of this species) are sometimes to be found dead in great numbers along the shore where they have been washed up by the waves, victims of drowning either during some sort of migration, or when caught on the flats by the incoming tides.

Low (1906) does not mention either the present species or *Lemmus*.

Soper (1928, pp. 55-59) did not find this species on Baffin Island but gives us an extended discussion of *Dicrostonyx grænlædicus* (Traill). Kumlien's remarks (1879, p. 53) upon *Myodes torquatus* probably apply likewise to *D. grænlædicus*, as do Hantzsch's upon *Dicrostonyx hudsonius richardsoni* (1913, p. 150).

Mathiassen (1931, p. 27) simply says that "lemmings" are abundant on Southampton Island.

Mr. Ford told me that these "lemmings with the big claws" had always been common on Southampton Island, since his arrival there; and that he had also observed them on Coats Island.

Family LEPORIDÆ.

Genus LEPUS Linnaeus.

12. *Lepus arcticus arcticus* (Ross). AMERICAN ARCTIC HARE.

(Plate VIII, figs. 1, 2)

Eskimo Name: Soper (1928, p. 59) gives the name in use in Baffin Island as *Ukaluk*, or "*Ukkulirk*, according to Hantzsch." The same name is in use among the Eskimos of Southampton Island, but I spelled it *Ookalik*, in all my field-notes. The etymology of the word is unknown to me. The first syllable is the same as that in the name of the willow (*Ookpik* or *Ookpuk*) and of the Snowy Owl (*Ookpikjuak*).

Status: The Arctic Hare is to be found all over the Island; but it is notably commoner in the higher country of the eastern part. Here the ridges offer shelter from the winter-storms. In the exposed places, which are wind-swept and the sheltered slopes where the drifts are not deep, food in the form of willow-twigs, mosses, and lichens may be found.

I saw but few signs of hares in the region of Cape Low. At Seahorse Point and along the southeastern coast the animals evidently were common. In the region of East Bay we saw a good many tracks during winter, but we found them most abundant along the southern slopes of the ridges and hills at Itiujuaq, and along the shore in the vicinity of the head of South Bay.

The Eskimos told me that hares are sometimes very rare for several continuous seasons. Then suddenly they will be common again. During the winter of 1929-1930 hares were plentiful in the same region where foxes and lemmings were more than usually abundant, so I had opportunity to observe the creatures to good advantage from day to day.

Records: During the late summer of 1929 I saw but one hare. This was on August 24. It was in almost full summer-pelage, a soft blue-gray in color, save for the ears, which seen from behind, were whitish with black tips. The animal was startled from a little clump of willows which grew along the southern slope of a ridge about two miles east of the Post. It ran uphill to the crest of the ridge, bounding along deliberately, its ears held high. It disappeared behind a large stone, giving me the impression that it had stopped there. When I reached the spot, however, the hare was nowhere to be seen. I have no idea how it so completely evaded me, for the country was very open. Upon returning to the clump of willows, I found an ample form in a sheltered spot, where the animal had been resting. Some of the twigs nearby had been nipped off either by hares or by ptarmigans.

I spent considerable time during latter August searching for this animal, but had no success. I did not see a hare again until September 13, when I collected an immature male in the high country northwest of the Post. At about eleven o'clock in the morning, when I first saw it, it was feeding on moss or lichens in what appeared to be the bed of a small dried-up lake. When it perceived me, it stood up on its hind legs, beat the air rapidly with its front feet in what appeared to be a very characteristic manner, and bounced up and down slightly on its hind legs as if trying to get a better view of me. The eyes were a strange shade of yellowish brown, darkest along the outer edges, and the pupils were slightly oval, not perfectly circular. The face had the expression of a jack-rabbit, and the eyes were not very beautiful. The stomach was stuffed with well masticated lichens, moss, and the leaves and bark of willow. This animal was not blue-gray in color; it was decidedly whitish all over, though there was a clouding of brownish hairs covering the upper parts and two definite tufts of rather dark smoky gray hair on the upper part of the flanks. The animal must

have been about three-quarters grown. It is interesting that the change of pelage was thus taking place, even before full maturity had been attained.

On September 26 many tracks were seen in the light, new snow along the Anderson River, especially in the gorge. On September 30 Keetlapik secured two almost pure white individuals at Salmon Pond (Mathiasen's Darkness Lake), neither of which I had opportunity to preserve. On the following day, Keetlapik got a perfectly white one, a female.

On October 2 Jack Ford and I had an interesting time collecting a specimen. We were crossing a broad lake on the clear, not very thick ice. All at once, on the opposite side, along a ledge of dark rocks, we spied what appeared to be a rather brilliantly white patch of snow. We could not believe it to be a hare, and yet for some reason we kept our eyes on it, as we approached, and finally became really curious about it. The nearer we came the more certain we were that we were being fooled, yet we kept on, and finally when within about thirty feet of it we could see the long fur waving in the breeze. It was sitting in a very exposed position. When it jumped up, it waited not an instant to inspect us, but made off at great speed, bounding beautifully among the rocks to a distant ridge. We had to head it off in order to get a shot at it.

During the rest of October I continued to see a few hare-tracks every day, but did not see any animals. They were reported as abundant about Prairie Point and Munnimunek Point, and the Eskimos shot one now and then for food at Native Point.

On November 2 I noted many trails north of the Post and observed places where the animals had uncovered the tops of willow-bushes. I also here and there observed droppings scattered about on the snow.

On November 9 I followed one animal for about three hours, observed its manner of doubling back on its trail, watched it scratching the snow back in exposing lichens on the faces of rocks, and noted that its color, in comparison with the somewhat bluish snow was a very pale, silken yellow. It was very wild. When I approached it, it would stand up high on its hind legs, flick its front feet or paddle them rapidly, then dash across a prairie, making for a distant ridge, where it would disappear over the crest; then, as a rule, double back on its own trail for from fifteen to thirty feet, leap off to one side, then make its way about the crevices among the boulders. Once the animal doubled back for a distance of three hundred yards, and when it leaped off to one side it made its way along the snowless crests of boulders and other open spaces so carefully that I lost the trail.

Trails observed on this date principally followed the ridges, and led about the larger boulders, where there were crevices, more than across the open prairies. In and about these crevices there were also a great many droppings.

On November 16 I saw two hares, both of them wild, and secured a fine large male, weighing 10 lbs., 9 oz. The eyes were yellowish brown and were large and staring while the animal was alive. The two animals seen were running rapidly across the frozen lakes. In securing the specimen I had to run along behind a ridge and surprise the animal as it ran toward me.

On November 18 one of my fox-traps was sprung by a hare, and I found hairs in the trap. Hare-tracks and droppings were to be seen all about. The animal may have been attracted by the odor of the bait, but I think it more likely that it had been curious about the mound of snow in which the trap was set, or about the human tracks which led about the ridge, which it frequented.

On our trip to East Bay in latter November and early December we saw very few hares or hare-tracks; but we might have seen more had we not been preoccupied in finding caribou.

On December 9 I saw innumerable tracks all about the head of South Bay and noted that one animal had nibbled at a piece of frozen fish, which I had used as bait at a fox-trap. On December 10 Jack Ford saw two feeding on willows at about sunset (early in the afternoon) in an open meadow. He secured the smaller of the two animals, and brought it to me. It weighed 7 lbs., 10 oz. The eyes were deep brown, rather than yellowish brown. It was not at all fat, but the stomach was well filled.

On December 11 I noted that, wherever I had made extensive excavations for lemmings, and had piled up great heaps of snow, there were always many hare-tracks on the following morning. This I took as evidence that the hares are decidedly nocturnal, even in winter, and that they are naturally either curious, or have such a keen sense of smell, that they know when their food-supply has been uncovered by such digging.

On December 14 I went out upon the rough harbor-ice to find a hare. Tracks led everywhere among the pinnacles and walls, and it was not always easy to follow a trail, as it led through narrow defiles, across thin shells of crust, down into depressions which the high tide had filled with water, and which steamed in the cold air. It was exceedingly difficult to find the hares. Once, after I had followed a trail for an hour or more, I decided the tracks were so fresh that the animal must be running ahead of me. Thereupon I mounted a high piece of ice and sat down, binocular in hand. I had but a moment to wait. Beyond the next ice-ridge, ambling along at an easy pace, was a hare. Now he sniffed at a piece of kelp, which clung to the ice, nibbled it daintily, and stood on his hind legs to watch me. When I moved he dashed over a chunk of ice nearby, made his way along a deep drift, and passed out of sight behind a pinnacle. I never got so near to him again. Another one I just happened to see as it crouched in the shelter of a chunk of ice, dozing in the sun, eyes only half open. I tried to slip up to this animal and surprise it, but it heard the crunching of snow and was off in a twinkling.

On December 15 Jack Ford shot a nice male weighing 10 lbs., 2 oz. On December 21 I secured a female, which weighed 7 lbs., 8 oz. It was not fat. On December 29 I caught a hare in one of my fox-traps. It had struggled fiercely to free itself, and was not in good enough condition to preserve. It weighed 7 lbs., 9 oz. On the following day Sam Ford caught one in one of his fox-traps, a small, dark-brown-eyed female, weighing about 7 lbs. Mr. Ford told me that he thought the dark-brown-eyed animals were young.

During early January there was a period of about ten days when we saw virtually no hare-tracks anywhere about the head of South Bay, in places where the animals had been numerous during the preceding weeks. The Eskimos told us that the *Ookalik* had migrated to some other part of the Island.

On January 9, however, we again saw a great many tracks about the caches of rotten fish and the oil-shed at the Post.

On January 12, just as I was starting without my gun to visit my long trap-line, I saw a hare crouched on a rock, apparently dozing in the shelter afforded by a low drift. When I approached the animal, it rose lazily, moved slowly away, and acted as if it wanted to return to its couch. Since hares were usually very wild, I was dumbfounded at its behavior. Thinking that I might be able to get the specimen, I went back to the Post to get my gun, and ran back as fast as I could, to find the creature only a few rods from the spot I had last seen it, dozing once more in the shelter of a little stone. Evidently this individual had had little experience with human beings, and I am of the belief that it had come down to the shore from the high country of the interior. The eyes of this individual were dark brown.

On January 21 I caught a large male animal, with dark brown eyes in one of the fox-

traps. When I came up to the captive animal, it tried desperately to get away, then gave itself over to the most pitiable wailing and screaming, a cry hoarser than that of a stricken Cottontail, but with the same similarity to a baby's crying. At this time a great many tracks were to be seen all over the ridges and at all the fox-traps.

During early February I noted that a great many trails appeared to follow or parallel each other, as if mating might be going on. Mr. Ford told me, however, that he thought mating usually took place during the bright days of March and April.

On February 8 Shookalook's dog-team gave chase to a hare at Seal Point, and almost caught it. The Eskimos do not approve of such chasings, for the dogs become so excited that they lose all restraint and may upset and damage the *komatik*.

On February 10 one was seen at the Post, running about among the buildings. When we called to it, it stood up on its hind legs, looked at us with a comically quizzical expression, with long ears widely separated and dropping carelessly.

On February 13 Jack Ford secured a large and very fat male not far from Seal Point. I spent a good deal of time following trails, and finally located a fine, big animal, resting on a rocky islet in the middle of a broad lake. When this animal took flight it ran straight across the lake, then upon reaching the shore turned sharply, and made its way toward the shore of the frozen bay. I had great difficulty seeing it as it ran in the snow. I had no great difficulty following it, however, for the tracks were obviously fresher than the others. If I called to the animal or whistled it usually stopped a moment to listen. Finally it gave up running here and there among the ice chunks and headed straight across the harbor.

During February the hares sprung a great many fox-traps. In fact, they were rather a nuisance. They seemed to have a predilection for blundering about the ridges, where I most wanted to capture foxes, and they either sprung the traps or broke the thin shell of snow above them, so that the foxes became suspicious. On February 20 I caught a female in a trap. It was not fat, and weighed about 7 lbs. On the following day I chased an animal about for an hour or so, and was much interested in its behavior. It did not run rapidly, but it always stayed out of the range of my shot-gun. It always made for the high places, where it would stop, stand on its hind legs and watch me as I labored across the valleys, where the snow was usually deep and progress unpleasantly slow.

During March I did not note any particular evidences of mating; none more definite than I had seen in February. The animals continued to be common all about the head of South Bay. We ate them frequently, and found their flesh delicious. On March 27 Sam Ford caught a large female in one of his fox-traps. This animal showed the slightest evidence of a change to summer-pelage. There was a noticeable darkening of the "vellum" in the region of the face and on all the feet. It was not fat. There were no embryos.

On April 1 Santiana shot a large male at Prairie Point. The gonads of this animal were greatly distended. Another male was secured the following day. I was much interested in the discussions of the Eskimos upon the sex of these animals. They informed me that *Ookatik* was the only animal they knew about, in which the *male* gave birth to the young. I was considerably impressed by this statement, and asked a good many questions about the matter. I am of the opinion that the external appearance of the sexual organs is so similar in both sexes that the Eskimos have come to the conclusion that the hare is hermaphroditic. And I must say that it was not an easy matter for me to set them straight upon the matter, for it was not always possible for me to state with certainty the sex of an animal just killed and not yet skinned.

During latter April Pumyook and Kyakjuak saw many hares in the high country border-

ing Fox Channel, northeast of the Post. On April 27 they shot a perfectly white animal, the "vellum" of which was not spotted with dark areas. During the period from April 24 to May 1, when we were at the floe near Native Point, we did not see any hare-tracks along the edge of the ice. Evidently the animals do not range far from the food-supply, which exists only on land.

I became best acquainted with the behavior of hares, when Tommy Bruce and I made our memorable trip to Itiujuaq in an attempt to reach Fox Channel. Here on the rocky hill, especially along the crest of the hundred-foot cliff, hares were really abundant. On May 20 we must have seen twenty individuals and we shot three, all of them in white pelage, but with spotting on the "vellum." We found the animals in the highest places. Sometimes two individuals, probably mated pairs, were startled at the same time, and they invariably made their way up the rocky slope into places, which were most difficult of ascent.

On May 21 during the wild gale which enveloped the whole region in swirling sheets of snow, Tommy and I hunted hares on the ridge. It was an unforgettable experience. The wind was so fierce that we could scarcely stand upright when it struck us with full force, so we made our way along the sheltered places, picking our course among the rocks, and taking care not to step over the edges of the cliffs. We finally found it best to take separate courses, since it was so difficult to see ahead of us, that we did not know how many hares we were starting. When we hunted separately, hares began to appear everywhere. All the animals Tommy started eventually came running toward me, and the ones I started ran toward Tommy, and the hour was exciting. We got four specimens, all but one in pure white pelage, but all with much blotched "vellum." One individual, a male, had a definite area of gray fur showing all about the eyes, and the ears appeared to be changing color.

From this time on hares were seen only infrequently. I think they did not actually leave the country, but my interests centered chiefly in the returning birds, and I did not spend much time with the mammals. On June 13 several particolored individuals were seen in the region of Itiujuaq and Itiuchuk. These were white with broad blotches of blue-gray.

I never saw the nest or young of a hare. Mr. Ford told me that he had several times seen young, and had found one nest, in mid-June, containing six small young. This nest was situated in a fissure between rocks along a rather high ridge not far from the northern shore of South Bay. The Eskimos told me that they had found nests containing as many as eight young, and that one of the best-known breeding-grounds was the island near East Bay known as Tooktootok.

Annual Cycle of Activities: The Arctic Hare of Southampton apparently always changes its color with the seasons. In late summer it loses its blue-gray coat, becoming white first on the underparts, retaining a brown area down the middle of the back until about the time the first deep snows have fallen. In full winter-coat, it is handsome silken white, with yellowish gloss, save for the black tips of the ears.

In winter, as in summer, it prefers to inhabit the higher places, especially the rocky ridges, where it finds shelter; as well as slopes, where it may feed on lichens, which grow on the faces of the exposed rocks, or where it may dig for willow-twigs or for moss. I think the animals paw away the snow with their front feet only, but I am not certain of this. They feed rather erratically, digging in one place for a while, then passing on to another, long before they have exhausted the supply of lichens or willow-twigs in the one area, from which the snow has been pawed. They are curious, for they follow a man's trail sometimes for miles, perhaps partly to nibble at the willow-twigs his deep foot-prints have exposed, but chiefly, I think, merely because they are interested. Every night they wander widely, going

about the fox-traps, which have been set, following the latest komatik-trails, wandering about the buildings of the Post, and paying especial attention to recent diggings of any sort in the snow.

During the day they usually rest most of the time, and it may be that they even sleep. On bright days they sometimes sun themselves, especially among the rough ice along the edge of the frozen salt-water. They are usually unsuspicious, if they have had little experience with man; but after they have been hunted, they become very wary, and will run off to great distances at amazing speed.

Mating probably takes place in early spring, in March or April, perhaps earlier, and very likely when the days begin to become long, bright, and warm. Whether the animals are polygamous I cannot say. The change of pelage takes place in latter April, May, and June. The areas first affected in this change are the face and feet. The inside of the skin is considerably blotched with gray some time before the outer appearance of the animal changes at all.

The young, which probably number from four to eight, are born in latter June or July. It is likely that but one brood is reared during the season. The nest is to be found among the rocks in rather high places, sometimes on offshore islands. According to Mr. Ford, it is usually placed under or between rocks, in a well sheltered place, and is lined with dry grass, moss, and a considerable quantity of the fur of the mother.

The principal enemy of the hare, so far as I could see during the winter of 1929-1930, was the Eskimo. Not that the Eskimo pursues the hare for its fur, flesh, or bones, but that he captures so many in his fox-traps. I did not once find the remains of hares in the numerous pellets of Snowy Owls I examined, nor did I find any evidence of the capture of hares by foxes or wolves. The abundance of lemmings probably had an effect upon the situation. During years when lemmings are scarce, the fox, owl, and wolf probably prey upon hares, whenever opportunity offers. So far as I noted, the Husky dogs never capture hares, though they sometimes give chase, and if they learn to make the rounds of the fox-traps they eat whatever they find there.

The Eskimos use *Ookalik's* pelt as a towel. They use small wads of the soft fur to plug the ends of their rifles on their long komatik-journeys. But they do not use it, in any way, so far as I could learn, in their clothing. The skin is, of course, very tender, and the fur delicate and easily destroyed. Many of the Eskimo's delightful tales have to do with the character, troubles, and behavior of *Ookalik*, the hare.

Taxonomic Remarks: In a discussion of the affinities of the Arctic Hares collected on Southampton Island it will be necessary to review Rhoads' (1896) key for separating *arcticus* from *L. grœnlandicus*. Rhoads has pointed out the following diagnostic characters for *arcticus*:

a. Upper incisors rooted on the inferior bases of the premaxillaries. Diameter of upper incisor wider than deep, its face strongly and broadly grooved.

b. Upper and lower incisors strongly and regularly curved, meeting within the arc of a circle mutually described by their exposed outer surfaces.

c. Total length of skull never exceeding 100 mm.; molars narrow and rounded.

For *grœnlandicus*:

a. Jaws prognathous; upper and lower incisors meeting at angles of 35 to 50 degrees. Upper incisors rooted on the anterior floor of the maxillary. Diameter of upper incisor deeper than wide, its slender sulcus filled with a functional indurated cementum approaching the consistency of enamelled dentine at the cutting edge.

- b. Molars broad and angular, very massive as compared with slender incisors.
- c. Total length of skull exceeding 100 mm.

Through the courtesy of the U. S. National Museum and the American Museum of Natural History we have been able to secure eight skulls of *L. granlandicus*, four skulls of *L. arcticus arcticus* and six skulls of *L. arcticus canus*. Together with thirteen skulls and skins of arctic hares from Southampton Island, this gives us a series of thirty-one skulls and thirteen skins, a large enough series to bring out certain observations, which appear pertinent regarding the relationships of these animals.

We find no striking differences in the skulls of *L. arcticus* and *L. granlandicus*. This conclusion seems surprising, perhaps, in view of the fact that various writers such as Rhoads, Nelson, and others, have stressed the difference in no uncertain terms. The angle of meeting of the upper and lower incisors is similar in the two species. In a Southampton Island hare, Carnegie Mus. No. 6566, and a Greenland animal, U. S. National Museum, No. 114,849, the angles are approximately the same. Not only in these individuals, but throughout the series, the angle approximates the same degree in both species. The Southampton hares, for the most part, have the large upper incisors rooted on the anterior floor part of the maxillary, a character supposedly restricted to *L. granlandicus*.

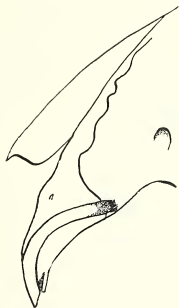


FIG. 4 Lateral view of left facial bones of an adult male of *Lepus arcticus arcticus*, Southampton Island. Portions of the premaxillary and anterior of maxillary have been filed away to show origin of anterior incisor from anterior floor of maxillary. Slightly enlarged. (Carn. Mus. No. 6566.)

The condition of the sulcus on the upper incisors is, perhaps, the most striking characteristic of the Southampton specimens. This groove is filled with an indurated cementum, so that the sulcus is completely obliterated as a groove, and is apparent only as a broad yellowish streak, set off sharply from the white of the rest of the incisor. Rhoads has stressed this as being an outstanding characteristic of *granlandicus*. Indeed, a specimen from the head of Woodland Bay (American Museum, No. 15,606) labelled as *granlandicus* is not nearly as well marked in this respect as the Southampton animals.

The one point which Rhoads has brought out, which separates the Greenland form from

the *arcticus*-group, appears in the relative ratio of the depth and width of the anterior upper incisors. In *grænlandicus* these incisors are deeper than wide, while in *arcticus* the reverse is true. This holds for all our specimens, as does the length of the skull, none of the Southampton Island hares measuring over 98 mm.

The molars are essentially alike in *grænlandicus* and *arcticus*, despite the statement of Rhoads that the latter has narrow rounded cheek teeth, while the Greenland hare has broad angular molars.

The zygomatic process of the maxillary is broader in *Lepus arcticus* than in *Lepus grænlandicus*. Other characteristics, such as the falling short of the premaxillary process at the base of the nasals, the position of the incisive foramina, shape of nasals, and the length of the bony palate, are essentially the same for *arcticus* and *grænlandicus*.

Unfortunately, with one exception, all our Southampton skins are in the white winter-dress. This exception is a young individual, judging by the size of the skull. It is in the white pelage but numerous gray hairs are to be seen throughout the dorsum. On either side of the rump there appears the last remnant of the summer-pelage, a distinct brownish fur, so colored even to the base, though the hair-tips are grayish. This summer color may be due to the immaturity of the animal, or to the definite brownish tinge of the average summer-coat.

The claws of the Southampton animals are strong and well adapted for digging through the snow, measuring as much as sixteen millimeters.

The skulls of two individuals, Carnegie Museum, Nos. 6468 and 6469, are very unlike the other skulls of hares from Southampton, the upper incisors being strongly curved downward and having a well defined sulcus. These may be immature individuals, but ossification is as complete as in the other individuals, and externally the animals appear like other adult specimens of *Lepus arcticus*.

Winge (1902) does not specifically distinguish the American or European Arctic hares from the Greenland animal.

After a consideration of the above characters we cannot hold with Barrett-Hamilton (1911) that this species is worthy of the rank of a subgenus. This writer has suggested the name *Boreolepus*, based especially on the protruding premaxillary region and large, slightly curved upper anterior incisors, which stand out clear of the skull, when viewed from above. We have discussed this point and have attempted to show that the prognathous condition is shared in common by specimens from Greenland and Southampton Island. It seems to us that *grænlandicus* may be found to intergrade with *arcticus*, more especially in that part of the range of the two animals which lies between Ellesmere Land and Southampton Island. To settle this question, it will be necessary to secure a series of hares from Cockburn Land and the islands lying about Melville Sound.

External Measurements of *Lepus arcticus* from Southampton Island

The external measurements of eleven adult hares are as follows: Total length, 592 (540-643); tail, 69.5 (65-76); hind foot, 154 (144-164). There seems to be little difference in the external measurements of the males and females.

Other Records: The Arctic Hare is not mentioned by many of the earlier writers. *Lepus arcticus* was originally described by James Clark Ross (see Allen and Copeland, 1924, p. 11) from specimens taken somewhere to the southward of Cape Bowen, northwestern Baffin Island. Ross (1826, p. 93) records the occurrence of the animal about Port Bowen. An early reference to the hare (perhaps not the present species, but assuredly a hare) is to be found

Skull Measurements of adult *Lepus arcticus* from Southampton Island.

Carnegie Museum No.	Greatest Length	Greatest Brdth.	Diag. Lgth. Nasals	Greatest Brdth. Nasals	Alveolar width upper Incisors	Alveolar length upper Molars	Greatest length of Mandible	Greatest brdth. of Mandible
6471 ♂	95	48	40	21.5	8	18	72	46
6476 ♂	95	48.5	41	19.2	8	17.5	73.5	47
6474 ♂	91.5	49	38.7	21	7.5	18.2	68	46.5
6479 ♂	94	48.3	37	19.1	8.1	18	66.1	43
6481 ♂	95.5	48	39	20.8	7.8	18	66.3	44.8
6490 ♀	95.2	48.1	38.1	20	8	18	67.5	47.7
6509 ♂	95.3	49.5	40	21.5	8	18	68	45
6566 ♂	97.3	48.2	41	21.8	8	17.8	69.5	46.6
6631 ♀	96.2	49.5	40	20.5	8	18.2	68.7	48
6678 ♂	96.6	49	40.3	19	8.7	18.1	69.5	47.7
Average	95.1	48.6	39.4	20	8	18.1	69.2	46.1

in the Observations of Captain Middleton, who speaks of the change of pelage of the animal during the different seasons (1852, p. 128).

Prebble (1902, pp. 59-61) describes *Lepus arcticus canus* in his paper, and says, further: "These fine hares occur sparingly in summer throughout the Barren Grounds from Fort Churchill northward. A few breed near Fort Churchill, and one was obtained there August 12. In winter they migrate to a slight extent, reaching the neighborhood of York Factory and perhaps farther."

Low (1906, pp. 125-128) mentions hares briefly, speaking of the vegetation upon which the animals feed.

Soper (1928, pp. 59-63) gives us a full account of the hare. He tells us that "no animal is more characteristic of the barren mountain slopes of Baffin island. . ."

Munn (1919) does not mention the species. Comer, in a personal letter says the animal was common in the high country back from Cape Low, but not along the coast proper. Mr. Ford told me that the animals were common both on Southampton and Coats Islands during his stay there. Strangely enough, Mathiassen (1931, p. 27) does not mention this species among the terrestrial mammals of the Island.

Order ARTIODACTYLA.

Family CERVIDÆ.

Genus RANGIFER Hamilton-Smith.

13. *Rangifer arcticus* (Richardson). BARREN-GROUND CARIBOU.

(Plate VIII, fig. 4)

Eskimo Name: I wrote the name of this well-known animal down as *Tooktoo*. Soper (1928, p. 63) gives us "*Tuktoo*; *Tuktu*, according to Hantzsch." The etymology of this word is unknown to me. It probably describes the antlers in some way, for the Eskimo word for *tusk*, *tooghak*, has a somewhat similar sound, as if the two words *Tooktoo* and *tooghak* might have similar roots.

Status: The Barren-Grounds Caribou was once a very abundant animal apparently all over Southampton Island. At the present time it appears to have disappeared almost altogether from the southern part and to be restricted principally to the region of the high country between East Bay and Duke of York Bay, and to the more or less unknown country inland from the coast and north of Cape Kendall. The caribou is sporadically migratory, and it may be that the abundance of the animals in former years throughout much of the southern part was largely the result of these migrations. Its wanderings are prompted, no

doubt, by scarcity of food; and of late there may have been little occasion for the animals to leave the range which they appear now to be inhabiting.

The caribou to my way of thinking is one of the most important Arctic mammals from the standpoint of the Eskimo. This is largely because the most comfortable (in fact one might say the *only* comfortable) winter-clothing is made from the skins of the caribou. The flesh of the caribou is highly palatable; but the Eskimos could live on seal-meat without difficulty, providing they are clothed well for their trapping, travelling, and hunting in the winter.

Records: Captain John Murray told me that when he first came to Southampton Island in 1902, he found caribou abundant in the region of Cape Low. His party had an abundance of meat and skins for clothing, sleeping-bags, and so forth. Captain Comer also found the animals common almost wherever he went on the Island. Captain Munn and his party must have procured a good many caribou, judging by the remains of the animals to be seen about the site of his headquarters at Seal Point.

According to the diaries of the Post at Coral Inlet, and the personal accounts of Mr. Ford, caribou must have been amazingly abundant about the head of South Bay during 1924. Under date of November 27, 1924, a note in the diary tells us there were "hundreds of deer" about the Post, and that they were seen in great numbers "daily." A great many animals were killed at this time, so many that there were great heaps of skins lying about everywhere. There were so many skins, in fact, that some of them were not well cared for, and decayed.

During the following year, there was a decrease in the numbers of caribou in this region, though a good many were killed. The diary gives us a good many notes on the numbers killed by the various hunters from day to day. During 1926, it was apparently necessary to go even farther afield to find the "deer." On October 31, 1926, John Bull killed thirteen of the animals at a point about forty miles north of the Post. In my gleanings from the diaries, I find little reference to caribou among the notes referring to 1927. On May 10, 1928, however, Amaulik Audlanat and Santiana killed ten caribou in the Duke of York Bay country. On January 4, 1929, two were seen near the Post. Three days later, Amaulik killed three not far from Poorhouse Hill. Thus, it appears, that during recent years not many caribou have been seen at the head of South Bay.

I had little difficulty in perceiving, when first I reached Southampton, that the caribou was a well known and important animal. Many of the natives, even in relatively warm, summer weather had garments either wholly or partly made of caribou-skin. There was much talk about the scarcity of the animals in summer, and of the difficulty of getting any summer skins from which the best winter clothing could be made. The best sleeping-bag at the Post had been made out of three winter caribou skins. At Seal Point, near the site of Captain Munn's former headquarters, I found quantities of caribou bones, including some skulls with perfect antlers attached which I was prompted to preserve. Mr. Ford regaled me with stories of the hunts they had had in former years on the very ground where the Post now stands. Evidently caribou had once been as common as lemmings and as unsuspicious as cows all through that section; but they were gone now, and the Eskimos were having grave difficulties in finding material for their winter clothing.

I first saw caribou tracks near our camp at Four Rivers on August 27; the animal had evidently come down to the shore from the Noovoodlik region, inland. The tracks were not fresh. I thought I saw the spoor of a somewhat younger, or at least smaller animal, also.

One of the Eskimo words for the month of September is *Akudligut*,—"the time when the

caribou winter-hair is half-grown." It is at this time that the animal takes on a whiter appearance than in summer. The antlers are fairly well grown, and the velvet is being rubbed off those which have fully formed and hardened. The antlers of the males are said to be better developed at this time than those of the females. At this time, too, migrations of a local character are undertaken by some animals, deliberate exodes from the summer-range to somewhat more sheltered country, where food may be found in winter. On Southampton Island, according to the Eskimos, these migrations are never extensive.

On September 3 at Cape Low, I found several caribou bones at the side of a lake, and examined some tracks along the margin of a small, mud-edged pool. These tracks, which were apparently those of a cow and calf, were fresh. There were also some droppings. I was surprised at the roundness and the small size of these. They reminded me of hare-droppings. On September 4 I found an almost complete skeleton at Four Rivers.

One of the Eskimo names for the month of October is *Nooliakvik*, "the time when the caribou breed." At this time the antlers of the males are fully formed and for the most part polished bare of the velvet. The males are said to fight desperately.²³ The antlers of the females, while fully formed, may, however, yet have the covering of velvet. Most of the winter-coat of creamy-white or gray-white hair has been assumed by both males and females. The animals are now generally speaking on their winter-range.

On October 5 some of the Eskimos, who had gone to Cape Low and were returning along the coast, saw four caribou not far from the "ice bank" at the head of Bear Cove, and shot one of them. I later learned that this was a young female.

During my rambles about the Post I was constantly coming upon caribou remains of one sort or another; antlers which had been used for anchoring fox-traps, or as shelves, or pegs in *igloos*.

On October 17 one of the Eskimos who had just come in from the district of Cape Low reported seeing four caribou not far from the mouth of the Kirchhoffer River, and told us that at Cape Kendall two *Tooktoo* had been killed. All in all, the Eskimos were rather discouraged at this time over the prospects of finding any caribou for winter consumption.

On October 20 Amaulik Audlanat shot a large male in the country just north of East Bay. The animal had a magnificent spread of antlers. Amaulik and his companions saw the tracks of at least five more animals, but this little band were being chased by wolves, so the hunters felt it inadvisable to try to trail them down. Some of the caribou meat was brought back for us to eat, and I found it delicious. At first I thought it would be difficult to eat raw, frozen *Tooktoo*, as the Eskimos ate it. But after a few meals I became very fond of it, would eat quantities of it, and eventually learned to like it quite as well as the cooked meat. The best meal of all, to my way of thinking, was a combination of the two sorts of meat—some of it fried, preferably in bacon grease, and some of it frozen solid.

On October 25 Tapatai reported that he had seen the tracks of three large caribou not far from Darkness Lake.

On October 30 other reports came to us of caribou sighted in the region north of Cape Kendall. At this date I took home some of the skulls I had found near Captain Munn's old headquarters at Seal Point.

On November 1 Shookalook returned from the Duke of York Bay region, exciting us all by his reports of many caribou. He had killed thirteen fine animals, and had brought us as proof the thirteen tongues and many of the skins. There was much rejoicing and talk every-

²³I never talked with an Eskimo, who had seen "Locked antlers"; but some of the Eskimos said that they had heard of them.

where of organizing caribou-hunts. On the same date Sheeloo killed four caribou in the region at the head of Koodloutok River, not very far from the Post. All the Eskimos who told us of seeing caribou reported also that wolf-tracks were to be seen with the caribou-tracks, and that the *Tooktoo* were constantly on the move trying to escape their ancient enemies.

During early November we had caribou-meat to eat practically every day. I never tired of it. Finally I learned to like the *Toonuk*, or fat, and the marrow of the bones, quite as much as did the Eskimos. The sounds of a caribou feast were always interesting to me. Here one Eskimo was cracking bones with a chunk of rock or a hammer, picking out the bits of frozen marrow; there another Eskimo was hacking off slabs of frozen flesh and smacking his lips in anticipation; there were sounds of licking of fingers, low groans of happy satisfaction, comments on the hunts of olden times. Great fun we had at our *Tooktoo* banquets!

During latter November I went on my first caribou hunt. We established camp at East Bay. I did the best I could at keeping accurate notes, though the cold made me miserable, and there was so much to do at times, that I thought I could never keep pace with events. On November 24, in the morning, we saw the first caribou-tracks. There were many of them all along the edges of and leading across the frozen lakes. We judged there must have been from twenty to thirty animals in the herd. The tracks were not fresh. We saw wolf-tracks among them. Later in the day we crossed the trail of eight animals which had been walking about feeding and not being chased by wolves. This was more encouraging. I measured the tracks and found them to be about eighteen inches apart. Some of the foot-prints definitely showed the marks of the cloven hoofs, others did not. In areas where the animals had been feeding, there were long double furrows where the front feet had been used to scrape the snow away from the moss and lichens. In places where these "diggings" were fresh, it was possible to follow the stroke of the foot from the point at which the two hooves were together to a point where they were two or more inches apart.

On November 25 we made our first visit to Tooktootok Island. The channel between this island and Southampton proper was frozen firmly, though the ice was very rough; but the waters of Fox Channel beyond the island were open and steaming in the cold air. Along the western side of this island caribou-tracks were to be seen everywhere. Evidently all the animals were headed toward the bigger island, for all tracks led northwestward and all were parallel to each other. Eventually I trailed the herd almost to the northernmost extremity of the island, where I found that the tracks led out across the ice to the larger Island. Everywhere along the broad trail were diggings and scrapings where the animals had been feeding. There were innumerable droppings everywhere, also, scattered about on and partly buried by the snow. I saw no wolf-tracks anywhere. Many of the tracks were of small animals. On the following day we encountered many more tracks, some of them fresh, but saw no caribou. We decided there must be several small herds in the region.

On this date I examined a pair of antlers taken from an animal killed about a week before in the same region (November 17). The antlers had on them no trace of the velvet. When I asked my companions as to how the caribou rid himself of this velvet they went through the movements of scraping their heads on the ground, leaving me with the impression that the velvet is scraped off on the rocks, and perhaps to some extent on the willow-bushes.

On November 27 at about noon, we knew from the behavior of the dogs that we were near a band of caribou. We were at this time in rough country, among imposing rocky hills. To our right, as we moved northward we could see the dull blue of Fox Channel; to our left extended the gray and purple monotony of hill, snow-bank, and frozen lake. The

dogs were eager, for they were hungry. As we rattled across a broad lake, one of the dogs suddenly gave a cry of excitement, the team turned so abruptly that I was thrown off the *komatik*, and away they raced as if pursued by demons. I tried to catch up with them, but it was utterly useless. Amaulik was powerless to stop them, for they had caught a direct scent of *Tooktoo*. Finally, by the time they were about two miles away, they had worn their fresh ardor down to such an extent that they could be stopped. When I caught up with them they were placid enough, lying in the snow, the *komatik* braced against a rock, the traces so twined about the rock that it would not be possible for them to dash away. The direction of the *komatik* tracks told us exactly what course to follow in reaching our quarry. We made our way toward Fox Channel, mounting the hills which gradually became bolder, threading our way along ledges, sliding down snow-banks, all the time trying to keep as quiet as possible. Finally we were on the last hill. Fox Channel lay at our feet. We had swung a little to the left of the direction we had first taken, and had missed the herd. We now made our way a little to the southward along the shore, and soon found ourselves on the rim of a small, high valley, surrounded by rocky knobs and ridges. There, on one of the lower slopes, their heads, ears and broad antlers silhouetted against the snow, were ten Barren-grounds Caribou, the first I had ever seen. We dropped to hands and knees immediately, slowly withdrew, and made an attempt to approach them closer by circling the rim of hills. But we had somehow made a false move; we had been too bold. The animals had heard, seen, or scented us, for when we again reached an eminence and peered cautiously over, they were fully two miles away, standing nervously in the middle of a plateau a considerable distance inland. They were not running; but the moment we rose they bolted. There followed one of the wildest, most tiring, and what appeared to be the silliest chases in which I ever participated. We actually *ran* after those caribou straight across the tundra, toiling like thrashing machines, soaking wet with perspiration. The caribou ran for a short way, of course, then rested while they calmly surveyed their pursuers. Finally we three hunters separated. By running down an incline and creeping up a ridge I had one memorable view of the creatures as they looked about. The largest male, evidently a sort of patriarch, was plainly the most concerned of all. He was ceaselessly on the alert, looking this way and that, throwing his ears forward and backward and sniffing the air. I was amazed to see him stand high on his hind legs like a hare and prance about while he surveyed his domain the more carefully, his ponderous antlers nimbly carried. With my glass I could see that patches of velvet still clung to his antlers.

When we three hunters came together again, it was decided that Amaulik should pursue the "deer" and Muckik and I remain more or less in an exposed position so as to attract their attention. I was glad enough to fall in with this plan, though I wished my clothes were dry. I examined some of the caribou-tracks and found many of them to be about twelve feet apart. The animals were merely loping at the time these tracks had been made. Here and there were pawings in the snow where they had been feeding now and then, as they fled. Two of the animals were much smaller than the rest, and there was only one really large bull.

Muckik and I drove the dog-teams back to the *igloo*; about an hour after dark, Amaulik came home, and rapped four times with a stick on the outside of the *igloo*. Muckik let out a delighted cry and I knew something pleasant had happened. The four rappings had meant that Amaulik had shot four of the caribou; and among the four was the big bull.

We went back to the carcasses as soon as we could, and skinned them out. We were not too prompt about this, for the foxes already were gathering. The largest male animal was very fine, though he was not old. The smallest of the four was a young male with antlers

completely covered with velvet. This velvet was almost black, with a few longer, whitish hairs here and there. The other two were fair-sized females.

The stomachs were all well filled with various sorts of vegetable matter—lichens, moss, willow-twigs, and grass. The Eskimos were eager to eat some of this as a sort of salad; I tried to join them but could not stomach it. I think my imagination was too good.

The pelage of the animals was not yet quite that of the dead of winter, though it was decidedly whitish. The large male was the whitest of all.

I was thrilled with this, my first caribou-hunt. As I went to sleep in my caribou-skin sleeping bag that night I thought again and again of the wild beauty of the scenes I had witnessed that day, of the big male caribou as he pranced about on his hind legs, of the coughing and abortive bawling I had heard the animals give as they prepared for flight, of the way in which they pawed in the snow for their food.

When I perceived that the big male had rid himself of the velvet on his antlers whereas the young male had not, I decided that either the big male had done more fighting and had consequently worn the covering off, or the young male was not yet of full maturity and was not therefore especially interested in making his antlers the keenest weapons possible. I asked the Eskimos about the matter, and they told me that only the old males mated as a rule; that one old male sometimes had as many as ten or more females in his flock; and that the young males battled among themselves for supremacy over such herds as they could muster together.

We did not have opportunity to hunt caribou any more on this trip for the weather turned bad and we could not get out, so we returned to the Post, where I proceeded to skin out the ears and noses of such specimens as I had decided to keep. In skinning out the feet of the large male I noted that cushions of fat extended down to the very hoofs, particularly between the two front toes, and that between these toes there was an extra sort of wad of long hair growing apparently from a special pouch of skin. Just what these were I cannot say, but presume they were scent-glands. Caton (1877) has pointed out that the Woodland Caribou and Reindeer have, deep between the toes, a curious gland that exudes an unctuous substance. This is probably part of a system of scent signals, as Seton (1909) suggests.

I noticed that on the inside of the skin of these caribou there were many oval protuberances. Upon examining these I found that each contained a small white grub, evidently the larva of some sort of fly. When I showed some of these to Mr. Ford, he told me that by spring these grubs would become almost as large as the end of a man's thumb, and that, upon reaching this stage, they would emerge from the skin, crawl out through the hair and fly away, to find a mate, and to fertilize, or lay eggs, before the coming of the fall. He also told me that another sort of "worm" infested the throat of "deer" especially in the months of April and May, and that, if a Husky dog ate one of these worms by mistake, the dog would die.²⁴

It is said that the antlers of the males at least usually drop off in December and January. Mating has been consummated by this time of course. The females, however, may retain their antlers much later. It is during the dead of winter that the animals are faced with their most difficult vital problems. Now they have to find food under the snow. Now they must flee from the wolves, which pursue them in packs. It is said that so long as the caribou can keep in a close-knit band they are safe from the wolves; but that once one of their number strays away and is cut off it is quickly surrounded and killed. One of the Eskimos told me of seeing three wolves attack and kill a caribou. Apparently they slashed

²⁴I was able to preserve a great many of the bot-fly larvæ found on the inside of the skin. But I never saw one of the throat "worms," about which Mr. Ford told me.

at the hind-legs until the unfortunate creature was ham-strung, and thereafter its doom was swift. When a band of caribou are attacked by wolves, they are said to form a circle, antlers out, and the smaller animals inside. Their behavior at such times is apparently similar to that of musk-oxen.

During the winter the Eskimos killed a good many caribou in the country bordering Fox Channel. On March 11 Amaulik Audlanat and his party brought nine caribou in to the Post, two of which, an adult female and a year-old female, he saved as specimens for me.

He brought back also an embryonic young, perhaps half the size of the new-born young.

When Jack Ford saw this embryo, he told me some of his earlier experiences with the Eskimos in hunting caribou. He had once been with them when they killed several females carrying fetuses. This was in December, 1926. The embryos were quite small, only about four inches long. The Eskimos refused to touch them, calling them *lddlauk*. They apparently had a superstitious fear of them. Nowadays this superstition has apparently disappeared, for the Eskimos use the red-haired pelt of the embryonic young in making gloves and mits and in other ways.

When opportunity offered, I gave final attention to preserving the skins of the specimens Amaulik had got for me and which were brought in on March 11. I found the hair of the young animal to be much softer and less brittle than in the adults. The antlers of this specimen were still altogether in the velvet, though the antlers themselves appeared to be firm and the hair quite dry. The adult female (which had carried an embryo) was in excellent condition. There were only a few bot-fly larvæ in the region of her rump.

On March 25, near Darkness Lake, Amaulik and his party shot eight more caribou. Seven of these had lost their antlers. This surprised me very much for I somehow had expected the dropping of the antlers to accompany the coming of the spring. By this time, of course, all courting, fighting, and mating were over; for the mature females were all gravid; so the excuse for antlers was past, for the most part. This, it appears to me, is abundant proof that the antlers are far more significant as implements of war-fare among the caribou themselves than as a means of protection. If their primary purpose is that of protection, why would not the females at least keep the antlers until the young are well developed, and more or less able to care for themselves. Amaulik told me that the antlers nearly always drop off in January or February. He said they sometimes drop off before the velvet has completely disappeared, and that, as the time for the shedding of the antlers approaches, the animals show signs of wanting to be rid of them, trying to break them off by pushing them against rocks.

The new antlers begin to appear in the males in March and April, sometimes earlier. Development of these is said to be very rapid. No fighting occurs at this time, for the antlers are delicate and sensitive. About this time, the females are likely to begin wandering off by themselves, to some solitude where they may give birth to their calves.

On April 20 Kooshooak and Santiana returned from a caribou-hunt in the region of the head of the Koodlootok River. They got three animals, two males and a female, all rather small-sized. They saw the tracks of several others.

On April 26 Tapatai (whose real name was said to be Pitautuk) killed five caribou, all females, only about fifteen miles northwest of the Post. Four of these animals were carrying embryos, but I got no definite information as to the size of these. They must have been almost ready to be born. The animal without an embryo, probably a last year's young, still had antlers on its head and these were fully covered with velvet.

It is said by some that the month of May is called *Nukallit* by certain Eskimo tribes,

signifying the "time when the young caribou are born." I am not sure that this is the case in Southampton Island as a rule, and according to Soper (1928, p. 72) it must not be so in Baffin Island. During May the antlers continue to shoot out and up, and the moult of the winter hair probably begins.

On May 29 in the region just south of Duke of York Bay, Shookalook and Santiana killed five caribou, a male and four females, and Santiana found a newly born young lying on the tundra, which he brought to me as a specimen. This individual measured 620 mm. over all. It was very handsomely spotted with white, the hair in general being of dark red-brown shade, much richer than in the adults.

With the coming of summer, the winter hair drops off in patches, sometimes disappearing very rapidly, and is supplanted by a softer, somewhat less brittle, darker coat, which is very popular among the Aivilikmiut for making the winter *kooletahs* and trousers. The month of July is called *Shuguliut*, sometimes, in recognition of the fact that the caribou-hair is shortest at that time. It is at this period that the animals are bothered by the mosquitoes and other insect pests. They are said to frequent the water so that they may plunge in and rid themselves of the swarms of flies.

I had many conversations with Mr. Ford and with Amaulik Audlanat as to the habits of these fine mammals. Evidently many of them bring forth their young on the island known as Tooktootok, and either walk across the ice to Southampton or swim across the channel when the young are of the proper age. Only one young is born as a rule, though two have been known. The young are born in the latter part of May, or during the first ten days of June. Young animals have antlers by the early fall, and both males and females bear them, though the antlers of the female are smaller.

Amaulik told me that the Eskimos were very fond of the *toonuk* (fat), the marrow, the eyes, the stomach contents, and the flesh in general for food. The velvet of the antlers is used chiefly for decorations²⁵ or for charms. The hooves are not used for anything in particular; but the antlers are used for shovels, trap-fasteners, knife-handles, and so forth, and the sinews, especially those of the back, are valued highly as thread. This thread is known as *cevaloo*. Thread may be made of the sinews of the legs, but the back sinews are best. The skins are used in many ways, for clothing, decoratively, and so forth. Eskimo drums were once made of caribou-skin tightly stretched across a hoop or its equivalent.

The skin in summer is thicker and the hair softer than in winter. The hair of caribou is variously used. It is sometimes stuffed in little wads into the Eskimos' nostrils to keep these from freezing, or into the muzzles of rifles to keep the snow out on long trips. The white-haired skin of the underparts of the animals is used decoratively. The skin of the legs and ankles is used extensively in making small boots, inside boot-feet, and mits. The antlers were once extensively used in making fish-spears, snow-knives (panas), harpoon-heads, barbs, and so on. Slender sesamoid bones are used for knitting-needles. Boot-scraper are made out of the big bones of the fore-leg. The flat shoulder-blades are used as snow-scraper, and also to clean the fecal matter from the hoods on the skin-mattresses where the Eskimo babies are kept. The gristle of the ear and the intestines are eaten with relish. The teeth are used ornamentally. The skins are pleasant to work with, because they are soft, and the blood comes off the hair easily. If the Eskimos kill a great many

²⁵The hood of my own very handsome *kooletah* was decorated with two strange little wisps of "velvet" from caribou antlers, dried into the shape of small, simple antlers; these were placed near the peak of the hood on either side, and are not noticeable save on close inspection.

caribou they may cut the flesh up into strips and dry it during the summer. But they prefer to keep it frozen for winter use if they can.

Mr. Ford told me that good-sized, full grown male caribou, ready for eating, minus their skin, legs, and head and paunch weighed, according to his experiences, from 120 to 150 pounds. I never had opportunity to record any accurate weights before the animals were cut up.

Taxonomic Remarks: As has been noted elsewhere in the present paper, Comer (1910, p. 86) has stated that "the Southampton caribou differ in size somewhat from those of the mainland" and "the species, therefore, remains to be described." Other writers, notably Mathiassen (1931, p. 27) have called attention to Comer's statement and Mathiassen has corroborated it to a certain extent, saying that "it is confirmed by the Eskimos." He further states that "the difference is not conspicuous."

One of the senior author's principal labors during the winter of 1929-1930 was the procuring and preserving of some caribou specimens upon which taxonomic studies might be made. A fair-sized and representative series was obtained, including one complete adult male and the antlered skulls (one without lower jaw) of two additional adult males; a complete adult female, together with two separate skulls (with antlers) of adult females; a complete young male, with antlers in the velvet; a newly born calf; and an embryonic specimen.

Measurements of skulls of *Rangifer arcticus*

CATALOGUE NUMBER	FROM SOUTHAMPTON ISLAND				FROM REGION OF WAGER RIVER ²⁸			
	(Skull only)	6 m G.M.S.	(Skull only)	166 m G.M.S.	9498 A.M.N.H.	19499 A.M.N.H.	19500 A.M.N.H.	19505 A.M.N.H.
SEX	Male adult	Male adult	Male adult	Female adult	Male adult	Male adult	Male adult	Female adult
Total Length condylo-basal ..	352	348	...	302	345	348	345	337
Tip of Premaxillary to tip of Nasal.....	115	103	...	90	105	91	97	85
Length of Nasal.....	133	131	...	96	102	117	109	89
Zygomatic Breadth.....	144	151	146	121	134	133	134	112
Greatest Breadth at Orbits.	180	168	176	150	163	165	162	147
Mastoid Breadth.....	146	121	145	96	125	131	126	96
Palatal Length.....	242	237	...	203	215	220	215	200
Palatal Breadth at m ²	60	52	55	49	59	58	58	53
Upper Tooth Row, Crown Surface.....	96	89	93	81	90	84	93	82
Length of Mandible, Incisive border to angle.....	294	296	...	253	272	272	283	250
Angle to tip of Coronoid.....	135	136	...	112	134	131	135	118
Depth at m ¹	36	32	...	29	31	32	36	28
Length of Lower Tooth Row...	103	96	...	87	92	93	97	87
Diastema.....	117	116	...	96	105	101	107	93
Antlers, main beam to tip along outside curvature.....	1270	1043	1135	436	1175	1100	1062	340
Antlers, greatest spread at point of palmation.....	826	563	933	287	587	750	440	190
Antlers, distance between tips of longest tines.....	533	218	542	178	400	498	200	168
Antlers, length of brow antler, ventral border.....	281	246	298	...	275	265	335	...
Antlers, transverse breadth of brow.....	250	67	219	...	190	139	250	...

²⁸These measurements of caribou specimens from the Wager River region are from Allen's paper *The Peary Caribou* (1908, p. 493). The specimens from which the measurements were taken are in the collection of the American Museum of Natural History.

Our study of the adult specimens, which were taken, leads us to believe that until a greater amount of comparative material can be assembled the Southampton Island caribou must be called *Rangifer arcticus arcticus*. Slight differences in size may be noted in specimens from Southampton and from elsewhere in the range of *arcticus*, to be sure, as an examination of the following table of measurements will show, but we are of the opinion at present that these variations are more individual than subspecific and we prefer not to propose a new name for the Southampton animal, until we are more fully assured of its actual distinctness from the form found along the mainland to the west, on Baffin Island, and along the east coast of Hudson Bay in the region of Cape Wolstenholme.

Other Records: Parry (1824, pp. 43 and 45) tells us that when he visited Duke of York Bay in August of 1821 he saw several caribou on the western as well as the eastern shore.

Lyon (1824, p. 46) recorded caribou also from the Duke of York Bay region.

Rae (1850, p. 93) observed caribou migrating northward about the first of March, near Repulse Bay, and found them on the west coast of Melville Peninsula as far as Fraser Bay (*Ibid.*, p. 149).

Preble (1902, pp. 41-42) noted the presence of the species on August 3, at a point about fifty miles south of Cape Eskimo, where he saw tracks upon landing. He says: "While we were encamped about 25 miles south of Cape Eskimo August 10 to 13 we frequently heard wolves howling in pursuit of caribou, and occasionally saw a few of the latter, of which we killed two, a rather young doe and a buck about three years old." He gives us a complete description of a male in summer-pelage.

Low (1906, pp. 23, 27, 126-128, and 159) makes several brief references to the occurrence of caribou throughout the Arctic archipelago, and discusses the hunting of the animals, and their importance to the Eskimos; but none of his references applies definitely to Southampton Island.

Comer (1910, p. 86) says: "The Southampton caribou differ in size somewhat from those of the mainland, but so far as the writer knows a complete specimen has never reached the hands of a scientist, and the species remains therefore to be described." He gives us another paragraph upon the caribou: "In hunting caribou, the natives crouch behind a ridge of stone which they prepare, and there they lie in wait, having first placed a bird-skin over the head."

Soper (1928, pp. 63-73) gives us a very full account of the species in Baffin Island, where it is evidently of somewhat local or irregular occurrence. He says: "The caribou at any particular season are unevenly distributed over the island, being governed in this respect by the occurrence of suitable vegetation and other factors."

Mathiassen (1931, p. 27) says: "*Caribou* are exceedingly numerous; in winter they gather on the western highland and on Bell Peninsula, whereas in summer they are more scattered about the island. We saw a caribou on White Island and near Kûk in September; in October by Hansine Lake, and they were exceedingly numerous around Kirchhoffer River during the whole of the winter. . . . The caribou on Southampton are said to belong to a bigger race than on the mainland; Comer mentions this (*ref. cit.*) and it is confirmed by the Eskimos whom I asked; the difference, however, is not conspicuous.

Family BOVIDÆ.

Genus OVIBOS Blainville.

Ovibos moschatus (Zimmermann). MUSK-ox.

Eskimo Name: Unknown to me.

Status: The Musk-ox probably never inhabited Southampton. Some of the Eskimos per-

sisted in telling me, however, that remains of the animals had been found once or twice, and that one full carcass had been found on the ice by an old woman along the floe near Cape Low. This last report may have some foundation in fact, but the finding of such a dead animal does not mean that that animal had ever actually lived on the Island. It might have drifted from far away.

One Eskimo brought me some sort of rounded crinoid-like fossil, calling it a Musk-ox horn. He may have been doing this just to test my credulity, or he may sincerely have thought it the remains of a Musk-ox; one never knows what may actually be in the minds of the Eskimos.

Other Records: None of the very early writers make reference to the occurrence of Musk-oxen on Southampton Island. Rae (1850, p. 49) found the species in the vicinity of Repulse Bay, however; and Tyrell (1897, p. 165F) saw fresh skins in the possession of the Eskimos near the head of Chesterfield Inlet in the summer of 1893. Preble (1902, p. 44) says the species has never been recorded east of Melville Peninsula. He says further: "The Eskimos who trade at Fort Churchill hunt the musk-ox in the Barren grounds several days' journey northwestward from Cape Eskimo."

Low (1906, pp. 58, 126-128) mentions the occurrence of Musk-oxen on certain of the Arctic Islands, but does not include Southampton Island (or Melville Peninsula) among these.

Soper (1928) does not even list the species, evidently believing that it has never occurred on Baffin Island.

Mathiassen (1931, p. 27) says: "Presumably the Musk-ox has lived there [Southampton Island] in former times, but has been exterminated. The Eskimos say that the head of a Musk-ox is to be found on the wall of one of the ruins of the houses on the south side of the Island."

Order CETACEA.

Family BALÆNIDÆ.

Genus BALÆNA Linnæus.

14. *Balæna mysticetus* Linnæus. BOWHEAD WHALE; GREENLAND WHALE; RIGHT WHALE.

Eskimo Name: I wrote down the Aivilikmiut name of these huge mammals as *Akvik*. Soper (1928, p. 73) spells this word *Aukvik*. I know nothing as to the etymology of this word, save that the latter syllable carries with it the idea of great size.

Status: Writers apparently agree that, while this whale was once fairly common, if not abundant, in the waters of the northern part of Hudson Bay, it is today very rare. Some even go so far as to call it virtually extinct. With the latter view I cannot agree, for we saw several Greenland Whales during my stay on Southampton and heard of a good many more.

Southampton has long been a famous whaling centre. Low (1906, p. 248 etc.) has given us a long account of whaling activities in the Arctic Seas, in which much of great interest is presented. For the present I shall be content to here give a few data, which I have gathered, and which have been given to me personally by some of the whalers, who have hunted in the waters about Southampton.

Captain Comer has had much experience with the whales of this region. In a personal letter he expresses the opinion that there are "few left" in northern Hudson Bay.

When Captain Murray first went to Southampton in 1902 he found some Bowheads, but they were not common.

A whole volume might be written concerning the experiences of these two men, and other whalers, who have hunted in the waters about Southampton; but we are chiefly interested here in definite data regarding the occurrence of the animals. Unfortunately not many such data have been preserved.

Whale Point, to the west of Sir Thomas Roe's Welcome was so named because of the abundance of whales at the entrance to the Welcome. Low tells us (p. 256) that "by far the greater number of whales taken in Hudson Bay have been killed in the vicinity of Whale Point near the southern entrance to the Welcome."

According to Mr. Ford Bowheads have been seen nearly every year since he has been resident on Southampton and Coats Islands, and during some seasons several have been seen. The animal is not to be found during the winter. Apparently it leaves the waters of Hudson Bay late in the fall, makes its way eastward, and does not return until the spring. When it appears in spring it frequents the edge of the floe, and when this breaks up, it lingers near the drifting masses of ice.

According to the diaries of the Hudson's Bay Company Post at Southampton, two very large whales were seen feeding near Bear Island, on November 8, 1924. During 1926 one was seen not far from the Post in South Bay on July 22, not long after the "harbor" had cleared of ice; five were seen near Native Point on October 6, 1926; and one was killed by an Eskimo named Black Peter, at Duke of York Bay, on October 23. During 1927 a young one was seen at the Native Point floe by the Eskimos on June 21, before the ice had entirely broken away from the shore; in 1928 Evaloo and John Bull got a large one at Seahorse Point on September 17. Other whales have doubtless been seen and killed since the establishment of the Post in 1924, but I do not happen to have data concerning them.

During July of 1929, Amaulik Audlanat had the good fortune to kill a large Bowhead not far from Leyson Point. The animal was mortally wounded, but it was impossible to stay in the region and wait for it to drift to shore. Consequently, it was planned that a special trip to Seahorse Point should be organized for the purpose of locating the whale.

When I learned that we were bound for Seahorse to find a whale, which had been wounded weeks before, I had misgivings. How could they know the creature was dead? If it had died, how could we ever find it along that long stretch of shore line?

Nevertheless we did find it. On September 20, while making our way eastward from Native Point about three miles from shore, we sighted a huge flock of gulls circling about a little cove. We made our way toward shore, saw that more gulls were rising, and eventually were able to make out the black mass sprawled in the water at the edge of the sand—the carcass of the great mammal. We stepped out of the boat upon the flabby mass and the Eskimos, full of glee, danced about until the vast body quivered like gelatine. Gulls and ravens flew about us. In the sand were the tracks of foxes and Polar Bears. Some of the precious *shookak* or baleen was gone, but much of it was still in the mouth. The expedition was a success. Amaulik set to work at once to saw off the jaws so as to get the baleen out. The rest of us went for a walk, or to hunt seals.

The whale measured fifteen long paces, certainly over 45 feet in length. The tail was almost seven paces broad. I was amazed at the size of the tongue, the smallness of the eyes, and the rank odor which came from the flesh. The specimen was a male.

We saw Bowheads several times in this general region, at about this time. On September 25 we must have seen six of the black giants at play. One of these persisted in

shooting itself free of the water high into the air,²⁷ falling back with a splash of white that appeared to drench the very clouds.

Other Records: The waters of northern Hudson Bay have been famous whaling-grounds for many centuries. Low (1906, pp. 249-250) says: "The memorable voyage of Baffin in 1616 first showed the value of the whale-fishery of Davis Strait, and as early as 1619, the first Dutch whaler was fishing in those waters. . . ." The American whalers did not attempt Arctic whaling until 1846, and have since confined their operations to the west side of Davis strait . . . and to [the] waters of Hudson strait and Hudson bay."

Hearne (1795, p. 392) tells us that Greenland Whales were formerly to be found as far south as the Churchill River, at which place, during the course of twenty years, three were killed; that they were, however, more plentiful to the northward; and that the Hudson's Bay Company once carried on a whale fishery in the vicinity of Marble Island²⁸ for several years but found the venture to be unprofitable and so abandoned it.

Lyon (1824, p. 48) noted whales (probably of this species) about Duke of York Bay, near Southampton Island.

James Clark Ross (1825, p. xxiv) recorded Greenland Whales from the western shore of Prince Regent Inlet, where they were seen in considerable numbers, and also from Boothia Felix.

Low (1906, pp. 248-278) gives us an extended discussion upon "whaling," centering his remarks upon the present species, which is considered decidedly the most valuable whale to be found in this general region.

Soper (1928, p. 73) says: "This large whale was formerly found in comparative abundance in Davis strait, Baffin Bay, and the northern parts of Hudson Bay. At the present time it is nearly extinct."

Binney (1929, p. 19) says: The Right whale . . . has of recent years reappeared in these waters [northern Hudson Bay] but not in sufficient quantity to justify a revival of the [whaling] industry."

Mathiassen (1931, p. 27) says: "In former times the coasts of Southampton Island abounded in *whales*." Mathiassen was probably referring especially to the present species, for other whales such as the *Kellilughak* are still to be found in great numbers.

Family BALÆNOPTERIDÆ.

Genus BALÆNOPTERA Lacépède.

Balenoptera physalus (Linnæus). COMMON FINBACK WHALE.

Soper (1928, p. 73) includes this species in his list of the mammals of Baffin Island. I, however, think it is rarely, if ever, found in the waters about Southampton Island. Low (1906, p. 273) says this species is found "in Davis strait, chiefly on the cod-banks, where it devours immense numbers of fish." Captain Comer thinks this whale never comes into Hudson Bay; and Captain Murray did not mention the species to me.

²⁷I was curious as to the explanation given by the Eskimos of these spectacular performances of the whales. Amaulik Audlanat told us that they leaped thus clear of the water, because they were constipated.

²⁸Low (1906, p. 251) says that the Hudson's Bay Company's first attempt to establish a whale-fishery was made as early as 1719, when a "frigate and sloop, under the command of Knight, were dispatched from Churchill" to carry on whale-fishing in the waters to the northward.

Family DELPHINIDÆ.

Genus DELPHINAPTERUS Lacépède.

15. *Delphinapterus leucas* (Pallas). WHITE WHALE; BELUGA.

Eskimo Name: The resemblance between the common Eskimo name for this species, *Kellilughak*, and a generic name once applied to it and one of the common English names, *Beluga*, suggests that the latter may have been derived from the former.* Low (1906, p. 274) spells the word *Kellulauak*. Soper (1928, p. 74) spells it somewhat differently again, giving us "*Killeluak*; *Kellellugak*, according to Hantzsch." The word may to some extent be onomatopoeitic, an imitation of the blowing sound made as the animals rise from the depths and sink again. Its etymology is unknown to me.

Status: Low (1906, p. 274) states that the White Whale "is common to all the Arctic coasts, and remains throughout the year. It usually travels in large schools, frequenting the bays and mouths of rivers." It was found to be common in all the open waters about Southampton Island, being seen frequently in South Bay and in the deeper waters all along the southeastern coast. In winter it is perhaps less frequently seen than in summer, but this may be only because it is not easy for the Eskimos to get out to the open water. During summer it is frequently to be seen not far from the shore, moving along deliberately in closely knit schools. It is particularly fond of the mouths of rivers, for some reason or another, and will sometimes make its way a short distance up the larger, deeper streams.

Records: White Whales were seen or reported frequently during the late summer and autumn of 1929. A good many had been killed during the preceding spring and early summer and the skins of these had been prepared for exportation. They had been noted and captured most commonly at Native Point, where, on September 18, I saw the remains of a score of carcasses strewn about on the beach or among the Eskimo *tupeks*. These animals had all been skinned, the highly prized *muckluck*²⁹ had been eaten by the Eskimos, much of the flesh had been cached for dog-food in winter, and now the stinking carcasses were lying about everywhere in various stages of decomposition. I think I never saw such slothful, contented dogs as lived at the Native Point encampment at that time. All of them had been fed to the point of repletion and they had but to ensconce themselves on, beside, or within one of the whale skeletons and begin gnawing, if they wished to eat any more. The gulls, too, were attracted by the offal that floated about with the tides, and great numbers of Herring Gulls in particular were to be seen about Native Point at this time.

On our trip to Seahorse Point we saw White Whales many times. They were abundant just east of Native Point; great schools of several hundred animals were seen near Kikkuk-towiyak Island and not far from the mouth of Lake Brook. As we made our way eastward in the motor-boat, we sometimes found ourselves actually in the midst of several schools of the handsome, though mysterious creatures. They were timid; the sound of the motor-boat frightened them to the depths when it approached too close; and the firing of a shot or two usually caused all of them to disappear until they had reached a safe distance. Their movements in the water were impressively graceful. When they came up to "blow" they did so easily, majestically, without making a splash of any sort, the white of their heads and backs gleaming like the frothy crests of small waves. Sometimes their heads came out of

*With this highly fanciful suggestion the Editor disagrees. It is generally accepted that the word *Beluga* is Russian in its origin (*Cf.* Century Dictionary, &c). W. J. HOLLAND.

²⁹The *muckluck*, precisely speaking, is the outer layer of the skin of the White Whale. Uncooked it has much the appearance and consistency of boiled white of egg, though I should say it has a flavor quite its own. Cooked, it becomes somewhat softer and more gelatinous.

the water so far that we could see their small eyes. As they moved through the water they must have kept their bodies bent considerably for the curves of their backs were always smooth and we did not often see their tails. The sounds of the blowing of a school of these creatures could be heard at a considerable distance; close at hand the sound reminded me of the noise produced by a big, tin tray held in one hand and shaken vigorously without actually being hit against anything.

I never saw flocks of birds definitely following the schools of White Whales, as I had expected. Arctic Terns and Herring Gulls sometimes circled round them for a time, then left them. Elsewhere and at other times I have seen flocks of fulmars following them for long periods at a stretch.

On September 21 a large herd was seen not far from Seahorse Point. On September 28 Amaulik Audlanat and Scotch Tom got three in the heavy nets, which had been set in South Bay. On October 1 a small school were seen near the Post. On October 17 Jack Ford saw a single individual in the "harbor" at the head of South Bay. The waters of this bay were closing shut at this time, and we saw no more *Kellilughak* thereabouts during that season. The Eskimos, however, told us that they had seen them farther out along the edge of the ice, and they were seen from time to time at the floe during the course of the entire winter.

On May 27, 1930, I saw a single White Whale at the floe south of Bear Island.

According to the Post diaries of the Hudson's Bay Company, these animals are taken in South Bay only during the summer. Here they may be shot with harpoon-guns or caught in nets. During 1925, White Whales were taken: on August 13 (one adult, caught in net); September 6 and 19 (one caught each day in nets). During 1926, two adults and one young animal were shot on July 21; and a young one was caught in the net on October 15. During 1927 two individuals were caught in nets, one on August 3, and the other on September 3. The above records are not the only ones listed in the diaries, but they serve to give some idea as to the period of the year when White Whales are to be found in considerable numbers in South Bay. They are frequently to be seen in great numbers shortly after the bay has become free of ice in July or August. And they remain thereabouts until the bay freezes over again in the fall. Mr. Ford told me that he thought a full adult White Whale would weigh about 800 pounds. Adult animals may be either gray or white, (though apparently usually the latter), as are also the young; so the statement that the young are *gray* or *brown* may to some extent be erroneous.

Mr. Joseph Grasset of the Revillon Frères Company, who has had much experience in the North Country, especially about Wakeham Bay, told me that he had seen newly born young, and that they were surprisingly large. He said too that the mothers were very valiant in defense of their progeny. According to all the persons with whom I talked concerning the matter, but one young is usually born; but there are reports of two young seen with one female, and I heard reports that as many as *seven* embryos had been found in one large female. The young are said to keep very close to the mother, and sometimes may be seen actually clinging to her, as if attached by an adhesive pad of some sort. This may be when they are sucklings.

The natives told me that the *Kellilughak* lived principally on *kingook* or sea-lice, and other small animals found in the salt-water, and that they did not pursue fish as a rule. There was, however, some difference of opinion as to this matter. They all agreed that they did not molest seals.

Other Records: The White Whale, White Porpoise, Beluga, or *Kellilughak*, is mentioned

by many of the earlier explorers in their journals. Foxe (1635, reprinted in 1894) tells us of whales seen near Coats Island. It is impossible to ascertain which species was encountered. Scoresby (1820, Vol. I, pp. 500-501) gives us a description of the present species in his *Account of the Arctic Regions*. Lyon mentions it several times: on August 13 (1824, p. 45) in the "Narrows" of Frozen Strait; and August 26 (1825, p. 54) somewhere in the region of Seahorse Point. Parry also (1824, p. 39) speaks of "many" White Whales in Duke of York Bay. Southwell tells us (1895, p. 94) that the whaling-ship *Balena* took eight hundred and twenty White Whales in Elwin Bay, Prince Regent Inlet, during the month of August, 1894. Captain Comer informs us (by personal letter) that he saw many White Whales in the region of Southampton during his various voyages between the years 1893 and 1920.

Preble (1902, p. 40) says: "This species seems to abound in all parts of Hudson Bay, and has also been recorded from several localities to the northward." Captain Murray told the senior author that he found White Whales common in the region of Cape Low during the season of 1902. Under "*Beluga catodon*, Gray" Low (1906, pp. 274-275) gives us a considerable discussion of the species in the waters of Hudson Bay and the Arctic coasts, where he says it "remains throughout the year." Munn (1919, p. 54) evidently found the species "scarce" during his sojourn about Southampton. Soper (1928, pp. 74-75) considers the species "by far the commonest of the Cetacea about Baffin Island, especially in Cumberland Sound and Frobisher Bay."

Binney (1929, p. 19) says: "Of all the other mammals the most common is the white whale . . . which is found all along the coast of Hudson Bay . . . and is usually netted in the river estuaries and in the sheltered bays. The white gelatinous substance which forms the inner coating of the hide (known as *mukluk* to the natives) is regarded as a great delicacy."

Mathiassen (1931, p. 27) apparently did not see the White Whale about Southampton, but calls attention to Parry's (reference above) mention of it. Mr. Ford told the senior author that he had seen White Whales in considerable numbers every year since his coming to the region of Southampton and Coats Islands.

Genus *MONODON* Linnæus.

16. *Monodon monoceros* Linnæus. NARWHAL.

Eskimo Name: Unknown to me. This was an unfortunate lapse on my part, for the Narwhal is well known about Southampton and the Eskimos undoubtedly had a name for it.

Status: The Narwhal has been seen or found dead a few times along the southern part of Southampton; it is regularly to be found, however, only about the northern part, in the waters of Frozen Straits, about Duke of York Bay and along the shore of Fox Channel north of Cape Fisher. It apparently inhabits colder waters than the White Whale. It is said to occur the year round wherever the water is open, and to go about in companies much as does the well known *Kellicottia*.

Low (1906, p. 275) says: "The natives of Hudson Strait kill numbers of these animals in the early summer, and after the shore-ice has formed in the early winter, but none are seen on the south shore during the open waters of summer. The narwhal is only found in the northern waters of Hudson Bay where it is abundant in the ice-laden waters of Fox Channel and Frozen Strait."

Records: During the fall and winter of 1925-1926, two Narwhals were found dead under

the ice at the head of South Bay, not far from the Post. The first of these was found in October, just after the "harbor" had frozen in; the other was found the following January (the exact date has been lost). Keetlapik saw two again sometime during the fall of 1929, not far from Bear Island. I heard various reports of others, which had been seen in South Bay by the Eskimos, but they were known to be very rare in this region. Amaulik Audlanat and others who had hunted in the Duke of York Bay region, however, had seen many of them in Frozen Strait and the more northerly waters of Fox Channel, and they gave me many interesting descriptions of the way they moved through the water, sparring with each other, crossing their long tusks, and rising and sinking in the manner of the *Kellitughak*.

Captain Murray told me of seeing Narwhals in the waters to the north of Southampton, and in Repulse Bay. He described the manner in which they "fenced" with their tusks, and told me that he thought they sometimes dug food up from the mud or sand, using these tusks as trowels.

Captain Comer, in a personal letter, makes some very interesting comments on Narwhals as he saw them about Southampton. He says: "Narwhals are quite numerous, especially on the Fox Channel side. I once sailed into a huddle of them. Their bodies must have been plumb up and down in the water while their tusks were bunched up quite close and were clashing together in playful mood. We sailed right into the huddle hoping to harpoon one, but they all settled and got away. Their tusks must have stuck out of the water from three to five feet."

Other Records: The Narwhal is mentioned by many writers, though it apparently has not often been recorded about Southampton Island proper. Scoresby (1820, Vol. I, pp. 486-495) gives us a description of the animal in his *Account of the Arctic Regions*. Both Lyon (1824, p. 45) and Parry (1824, p. 39) saw the species in and near Duke of York Bay during Parry's Second Voyage. Dr. Robert Bell (1879, p. 29c) says that it is occasionally killed about the northern part of Hudson Bay. Kumlien (1879, p. 67) says that in spring and summer it appears regularly in Cumberland Sound, Baffin Island, but that it is not at all abundant.

Preble (1902, pp. 39-40) lists the species, but did not note it personally while he was in the Hudson Bay region. Low (1906, pp. 275-276) gives us a considerable discussion of the species, saying that it "is found only in the northern waters of Hudson Bay, where it is abundant in the ice-laden waters of Fox channel and Frozen Strait." Munn (1919) does not mention the species. Soper (1928, pp. 75-76) gives us a brief account of the species as it occurs about Baffin Island where it is known as the *Killeluaksuak* or *Killnudlit*, and is apparently not very common. Binney (1929, p. 19) says: "In the most northern waters of Hudson Bay, around the mouth of Fox Channel and off the north coast of Baffin Island, the narwhal is hunted. . . In value it is very similar to the white whale, providing the so-called porpoise-hide from which boot-laces are made, and food for both men and dogs."

Mathiassen (1931, p. 27) apparently did not record the species near Kûk or at Duke of York Bay, but calls attention to Parry's reference, which is cited above.

Mr. Ford noted the species a few times about Southampton, chiefly in the waters to the north, and certain of the Eskimos, notably Amaulik Audlanat, said they had seen Narwhals in considerable numbers about Duke of York Bay.

LIFE-ZONES AND DISTRIBUTION

All the mammals found on Southampton Island, as with the preponderant majority of the species of birds, are representative of the Arctic Life-Zone. They are forms, which

are modified for existence in a barren, treeless region. Certain birds of slightly more southern affinities, such as the widely ranging Rough-legged Hawk, have established themselves on the Island; not so with any of the mammals.

A hasty inspection of the map leads us at once to surmise that the mammalian fauna of Southampton is similar to, perhaps identical with that of the mainland in the same latitude to the west, or perhaps with that of Melville Peninsula to the north. The bodies of water, which are responsible for the insularity of Southampton from these regions, are not wide. Frozen Strait, between Southampton and Melville Peninsula indeed is known to freeze over periodically, forming a bridge across which the Eskimos sometimes travel and across which such animals as caribou and hares may sometimes migrate extensively. There are, however, some very striking differences between the mammalian fauna of Southampton Island and that of the mainland.

Viewing the present distribution of Arctic mammals broadly, we are forced to recognize the probability that the relationships of species found on Southampton are actually closer to those of Baffin Island, the islands to the north of Melville Peninsula, and northern Greenland, than they are to those of the mainland to the west. The species of *Dicrostonyx* found on Southampton is, indeed, that found to the westward; but as Allen (1919, p. 512) has pointed out, *D. grælandicus* may be nothing more than a depauperate form of *D. rubricatus* of northwestern North America. The species living on Southampton is, indeed, *rubricatus*, the species found to the westward, rather than *grælandicus*, which is found on Baffin Island and in northern Greenland. Its distribution in Greenland indicates that its appearance there is of relatively recent occurrence, and that its centre of origin and closest affinities are probably to the westward.

The hare found on Southampton should, it appears, be *Lepus arcticus*, the species found on the mainland and in southern Baffin Island. Yet our studies of a good series of hares taken on Southampton bring to light the fact that the so-called *arcticus* of Southampton has many characteristics in common with *L. grælandicus* of Greenland and Ellesmere Island, and leave us with the conviction that the hares of Greenland can be only subspecifically distinct from those of Southampton.

The weasel of Southampton has been described as a distinct race.* The range of this form is, however, unknown. Whether the same form ranges also through Baffin Island or along the mainland to the west we cannot say until more material has been collected. It does appear to approach *Mustela arctica polaris* of Greenland rather than *M. arctica arctica* to the westward. The bear, wolf, and caribou, all widely ranging forms, are probably the same as found throughout much of this part of the Arctic. Although it has been said that the Southampton caribou is distinct from that of the mainland to the west (Comer, 1910, p. 86 and others, following his statement) we cannot find any differences striking enough to warrant the giving of a new name, and therefore believe that the affinities of this mammal are as close to those of the mainland as they are to those of Baffin Island, largely because of the propensity of this species to range widely, and to migrate and swim considerable bodies of water. The relationships of the fox we have not been able to determine satisfactorily owing to dearth of comparative material. But one species of this genus is to be found throughout this general region, so the relationships of the animals of the various islands will have to be determined largely by slight subspecific differences, concerning which we know next to nothing at present. The species of *Lemmus* found in this region is the same on Baffin, Melville Peninsula, and the mainland to the west, and the species appears to vary

*Annals Carnegie Museum, Vol. XXI, No. 2, 1932, pp. 79-81.

but little throughout the region, so we can learn little concerning the history of the spread of animal forms into Southampton or of former relationships from a study of *Lemmus*. The presence of this same species of *Lemmus* in the various named places, as with the fox, caribou, and so forth, intensifies our conviction that all this north country must once have been a vast, contiguous land mass, prior to the forming of many islands with the sinking of the land or rising of the Arctic sea. The fact that channels are known to freeze over, that floating masses of ice are known to carry animals from one place to another, and so on, can account for the spread of various mammals all over this area, to be sure; but it is somehow easier to believe that in earlier times all these well-known Arctic forms had established themselves widely throughout this Arctic continent, and that such differentiation as has taken place subsequently has been the result of isolation in places where the sum total of ecological factors has somehow been different enough to engender the development of new forms.

The status of the various terrestrial mammals mentioned thus far is such that we are tempted to consider the former connection of Southampton as having been with lands to the north and east, rather than with lands to the west. And when in addition we realize that there are four species of mammals, which occur on the mainland to the west which have never, apparently, been able to establish themselves on Southampton, our feeling naturally is that the connection of Southampton with lands to the east must have existed until a relatively recent date. The four mammals we have in mind are the Wolverine, the *Spermophile*, the Shrew, and the Musk-ox, all of which, but the Musk-ox, are known to regularly occur in the region to the west and perhaps also to the north, in Melville Peninsula.

The Musk-ox is very local in distribution. Its presence in this place and its absence in that place has puzzled students of zoölogy for decades. Apparently it does not range very widely; or, if it does so, it moves about in closely knit bands and does not tend to spread out through vast territories. Food conditions may very definitely determine its distribution. It is doubtful whether the animal ever lived in Baffin Island, yet it is to be found in the great islands nearby and in Greenland. It has never been found on Southampton; yet it has ranged throughout much of the mainland to the west, in former times even as far south as Churchill. So far as we can see, both Baffin and Southampton Islands might furnish the Musk-ox with a perfect home; yet somehow they appear to have never lived here.

The centre of distribution of the *Spermophile*, judging from the present day location of greatest number of forms and individuals, is certainly to the southwest of Hudson Bay. Yet this animal has penetrated far to the north because of its ability to meet a rigorous winter through hibernation. The *Spermophile* must have extended its range thus far to the north and east definitely after Southampton became an island, else it should certainly be an important member of the island's fauna today. The fact that this animal does not move about in winter may account for its never having come across the ice of Frozen Strait, or on floating ice in Roe's Welcome.

The Shrew, while active throughout the winter, could not negotiate a long trip across the ice without a good supply of food. Many a shrew may have started across to Southampton either on the ice-bridge or on a floating cake and perished within a day or two. Like the *Spermophile*, the Shrew must have invaded this country after the insularity of Southampton had been established.

The case of the Wolverine is, perhaps, not so easy to explain. Here we have a sturdy, widely ranging species, which might conceivably walk across the ice of Frozen Strait even without food, or be carried on the floating ice living upon such lemmings or other stranded

animal forms as it might find. The Wolverine is apparently well established in the region of Repulse Bay. The only reason, so far as we can see, for its absence at Southampton, is that it has not yet had occasion to range widely in search of food and has not therefore left the land and hunted over the ice. This species, too, has evidently invaded the region of Repulse Bay during comparatively recent times.

The absence of the Wolverine, Musk-ox, Spermophile, and Shrew on Southampton, cannot be explained ecologically, for ecologically the mainland to the west is very similar to Southampton. Average temperatures are about the same. Plant- and animal-life which determines the sum total of food-supply, array of natural enemies, and so forth are assuredly about the same.

In our discussion of the distribution of mammals throughout this region we have assumed that mammals have spread *into* Southampton from somewhere else. This, of course, may not be an altogether warranted assumption. Southampton, whatever its former land-connections, may have been part of the ancestral home of certain species *from which* they spread out into adjoining territory. The fact that Southampton is an island today, and that we have to take a boat to get there endows the place with a separateness and remoteness it may not possess from the zoogeographical standpoint. We have offered our comments realizing this, and realizing too, that further studies, and especially the collecting of further material in such regions as that of Boothia-Felix, may cast important light upon this whole matter of distribution of life in the Arctic.

PROBLEMS OF MAMMALIAN-LIFE OF SOUTHAMPTON ISLAND

With four exceptions, all of the birds which nest on the tundra of Southampton fly to the southward with the coming of the winter; the terrestrial mammals, on the other hand, must remain. Short days, deep drifts, high winds, and low temperatures are their winter heritage; for they cannot fly across the waters of the great Bay, nor make their way to the mainland on the ice. Since they must stay, they are equipped for a rigorous existence. They are deeply furred, some of them even all over the bottom of the feet; most of them are so colored that they cannot be easily seen by their larger enemies, nor by their smaller prey. They are either adapted to a subnivean existence, as are the two species of lemmings, or they are fleet-footed, so they can dash across the open, away from their swift enemies or in pursuit of their swift prey.

The eight species of mammals which live their lives on this Arctic Island; the Polar bear, the Caribou, the two Lemmings, the Weasel, the Wolf, the Fox, and the Hare, are so diversely modified in response to the demands of their environment, that it is almost impossible to group them in several categories. The strong-legged Caribou has great hoofs for pawing in the snow for food; his senses are so keen that he is quickly aware of approaching danger. He can run with rapidity. He is so tall, especially when standing on his hind legs, that he can see a long way across the tundra in clear weather. The Wolf, on the other hand, also has keen senses, and can locate the caribou-herds with the aid of his nose. He too can run with rapidity and, hunting in bands, can harass the caribou-herds until one animal is cut off from its fellows and the chase to the death begins. The Polar Bear, like the little Spermophile of the mainland to the west of Southampton, evades some of the issues of winter by curling up and going to sleep while the period of lowest temperatures passes, or leaves the land altogether to hunt seals along the ice far out at sea. The Hare, now white as the snow

upon which he crouches as he basks in the thin sunshine of January, has long, sharp claws for digging the crust away from the willow-bushes and the lichens on the rocks, and can run like a streak even in the lightest of newly fallen snow. With his big ears he can detect the smallest sounds that warn of danger, and his nose is ever a-quiver for some message from the frosty air. The Weasel, also white, is swift of movement, rarely finds himself far from a crevice into which he may dart as the shadow of an owl moves across the snow, and is so slender that he may follow the endless labyrinth of lemming-burrows as he will, curling up in the warm, dry nests, when he has tired of making his way along the deep, cool tunnels. And the lemmings, least of the tundra's furred denizens, drill for themselves a windless world under the snow—an amazing network of burrows which lead everywhere about the ridges, across the prairies, through the grass, among the willows, from nest to nest or feeding-ground to feeding-ground. So numerous are these burrows and so easy to construct, that a lemming scarcely has need to show himself above the drifts during the course of the long winter. Only the melting of the snow in the rushing springtime forces him out. In the drift he is safe from the owl and raven; but the weasel may follow him anywhere, and the fox may catch him unless he is very careful, for the fox too is keen of sense, can rapidly dig in the snow, and must find food in abundance, if he is to live.

The interrelationships of the mammals of the winter tundra are interesting indeed. All of them are equipped for the battle of life. All of them are ready for snowfall, bitter cold, and blizzard. The dropping of the mercury in the thermometer at the Post signifies no terrors for them. But they must forever be on the lookout for *each other*.

Only rarely are the wintry elements unkind to the furred creatures. The same wind that tells the wolves of a huddled band of caribou will quickly drift shut a trail. The wildest gale cannot blow away the lichens and mosses from under the snow. Even during the most savage of blizzards the pursuit of food goes on; the lemmings gnawing away under the drifts, the hares nipping off the buds or lichens, the weasels following the lemming burrows. The problem of survival in winter is more difficult for the wolf, perhaps, than for any other of the Arctic mammals. He is so large that he can scarcely subsist on lemmings. He ranges widely, using up energy as he goes. He becomes frantically hungry. Failing to locate caribou, he must follow the Eskimos' trap-lines and devour whatever he finds.

Most of the aquatic mammals usually move about as ice conditions dictate. The Ringed Seal or *Netchek* is an exception, living where he wishes, and keeping a series of blow-holes open in the salt-water ice where he may come up to breathe or to bask in the sunshine. The coming and going of the tides sometimes leads to difficulty for the seals, which have come out to sun at a blow-hole, and then are unable to get under the ice again to the water. Two photographs shown as illustrations in the present paper (see Plate VI) are of seals which were caught thus with the out-going of the tide.

The *Oogjook*, or Square Flipper Seal, prefers open water, and moves out to the edge of the floe; the Ranger Seal and Harp Seal may leave the region altogether in a sort of migration to better feeding-grounds. Walruses, White Whales, and Greenland Whales prefer to linger about the masses of floating ice, sometimes far from shore. Here are also to be found many seals of different species, and sometimes Polar Bears—either the males, or females which are not heavy with young.

The elements, on the whole, then, have little effect upon the mammals, for the mammals are equipped anatomically for weathering the worst in the way of weather, and they are prepared to go about getting their food in their own tribal ways whether the sun be shining or not.

Spring is probably the most difficult season of all. It is at this time that water floods the lemmings from their burrows; that the returning birds offer competition in the matter of getting food and bring new enemies on the horizon in the form of hawks, jaegers, and gulls; that patches of bare tundra mean a background where a tardily moulting *white* creature can be plainly seen; that gaunt bears emerge from their winter dens, ravenous for a gluttonous feast on seals; that litters of young wolves must be fed.

During the middle of the summer "flies" are sometimes very troublesome to some of the mammals. Mosquitoes, rising in incalculable millions from the shallow pools, lay siege to the mother caribou and her calves and make life miserable for them. Bears usually stay so close to the coast that the sea breezes keep the mosquitoes from becoming too bothersome. The caribou are also annoyed by the so called "deer-fly," a large, voracious insect that bites the animals and lays its eggs in the hair so that the young grub may bore into the skin and there grow to large size before emerging to pass into the pupal stage and drop to the ground. Caribou are also distressed by what have been called "throat worms."

Seals are sometimes fairly covered with lice of some sort—unpleasant, grayish insects, which hang to the folds in the skin by the hundred. Foxes and wolves have fleas, and foxes are sometimes infested with a scourge of ticks, very small creatures, which sometimes are so abundant in winter that the pelts of the animals are ruined.

Among the several predatory mammals of Southampton, the wolf is probably the natural enemy of the greatest number of other species. The wolf, when hungry, will prey upon almost anything he can find; he even has been known to visit the camps of the Eskimos to steal Husky pups and carry them away. He is virtually the only enemy of the Barren Ground Caribou.

The Polar Bear is, on the whole, an inoffensive beast, as compared with the wolf. The bear is principally an enemy of the seals. Occasionally he will kill a young walrus. He will live for long periods upon carrion if there happens to be a dead whale or walrus in the vicinity.

The Arctic Fox preys almost exclusively upon lemmings. It may occasionally kill a hare, and especially during summer may eat a good many birds. The wolf preys upon the fox to some extent, and the Eskimos aver that a Snowy Owl will sometimes kill a fox even when the fox is not caught in a trap.

The weasel's principal natural enemy is probably the Snowy Owl. The weasel lives almost entirely upon lemmings during winter, and upon lemmings and young birds during summer.

The hare's principal enemy is probably the Snowy Owl.

Lemmings are preyed upon by all the predatory mammals and birds from the largest down to the smallest. During summer the Long-tailed Jaeger and Pomarine Jaeger live for long periods largely upon lemmings, if these little rodents are numerous; and in the spring, before the bays and inlets have opened up, even the gulls beat back and forth across the tundra looking for mice. The raven captures lemmings whenever it has a chance and the White Gyrfalcon and Duck Hawk vary their diet of birds with occasional lemmings. If lemmings become rare in a certain region, the foxes, weasels, and owls usually migrate to a region where lemmings are common. If the scarcity of lemmings involves a large section the predators must wander widely, or they perish. This sometimes probably leads to the carrying about on floating ice of creatures, which otherwise would stay on land. Whether the lemmings of Southampton ever have become so numerous as to have destroyed their own food-supply and to have themselves migrated in search of food, is more than we can say.

When the animals which prey upon lemmings become so scarce as to permit an over-population of the little creatures, such an event might naturally occur. This might mean an almost complete depletion of the small mammalian life on the Island for a number of years.

A good deal has been said about "cycles of abundance and rarity" among some of these northern mammals. According to the information we have been able to gather, Southampton Island seems to have been somewhat less affected by such cycles, than have certain other sections of the Arctic. The Eskimos often speak of years when there are no foxes, no mice, no weasels, and no hares; yet the diaries of the Post at Coral Harbor show that foxes have been taken with considerable regularity since 1924, even during years when the catch of foxes in other parts of the North was very small. We have no comments to offer as to the cause of these so-called cycles. In a way it seems as if the behavior of all the creatures involved in these cycles depends upon the lemmings; for these lemmings furnish the bulk of the food of the smaller predatory mammals, and once the lemmings disappear, the weasels and foxes either have to prey upon other forms of life or move into new hunting-territory, or both. And once this moving about starts among any of the smaller mammals it is perforce taken up by them all, so that it eventually involves the entire mammal population to a greater or a lesser degree.

The worst enemy of the seals in the waters of northern Hudson Bay is the Polar Bear. Sharks may occasionally prey upon them, but sharks are very rare. The notorious Grampus or Killer Whale has not, so far as we know, ever been seen in these waters, so the seals are safe from this terror of the deep. Foxes are said sometimes to prey extensively upon young Ringed Seals, which are to be found during the month of March in snow-caverns on the frozen coves and inlets.

The worst enemies of many of the mammals thus are to be found among other, and usually larger mammals. The most formidable, in fact the only enemy of certain species, however, is the Eskimo. The Eskimo has to provide himself and his dogs with food and clothing; he has learned that he can get many valuable articles through trading with the Hudson's Bay Company; and he naturally likes to hunt. He therefore spends a large part of his time in pursuit of animals. All winter he traps foxes, the pelts of which he will take to the Trading Post; and seeks to destroy the wolf which devours his foxes. At the floe he hunts all kinds of seals, and walruses; from the seals he gets skin for making his tents, dog-harness, clothing, thongs, lines and so on, meat for him and his dogs to eat, blubber for his *koodilik* or stone lamp; and from the walrus dog-food and skin for tents and whips. Periodically he goes inland for *Tooktoo* or caribou, for from the caribou's deep-haired skin he makes the best of sleeping-bags, mattresses and robes, or if the animals be taken in summer, the most perfect of winter-clothing. He hunts *Nanook*, the Polar Bear, with high glee, for bear-skins are valuable articles of trade, or they can be used for making winter-trousers, boot-soles, or robes. The Husky dogs would almost rather hunt bears than eat, which is saying a good deal. And he shoots or nets *Kellitughak*, the White Whale, for the much prized *muckluck* and for dog-food, and even pursues and kills the great *Akvik* or Greenland Whale, because he knows the baleen is valuable in trade and the flesh useful as dog-food. Eskimos' on the whole, are not very thorough hunters; that is, they do not seem to take great satisfaction in capturing every animal they can see. They are usually too indifferent or lazy to keep after a swiftly moving band of caribou long enough to get them all. But they do sometimes shoot needlessly at seals which they know will sink and at walrus they have only vague hope of finding dead along the shore. The Eskimo pays little attention to hares, weasels, or lemmings.

THE FUTURE OF THE MAMMALIAN-LIFE OF SOUTHAMPTON ISLAND

It appears to us on the whole that the future of Southampton mammalian-life is bright. The Eskimo population of the Island is not large, and according to data at hand is not rapidly, if at all, increasing. Furthermore, the representatives of the Hudson's Bay Company who have thus far been stationed at Southampton have decidedly had the interests of the wild-life at heart and have gone so far as to make the Eskimos understand that the preservation of a proper wild-life supply is the best thing for themselves and their children. Modern fire-arms are to be found everywhere among the Eskimos, to be sure, and the Island is well suited to the maintenance of a good population of animals. Cut off as it is from the mainland; rarely visited by ships bringing hunters, trappers, or prospectors; furnished with sheltered valleys in which food in the form of plants grows; surrounded by waters, in which marine life which may be eaten by whales, seals, and walrus, thrives in abundance; Southampton may well be regarded as a sort of paradise for Arctic mammals. The Eskimos, as we have pointed out, are not thorough hunters. They sometimes kill more than they need, to be sure; but they are not on the whole "dead-shots," and they are too eager to play, or to tell stories, to keep on hunting as long as they can when animals are abundant. They understand that the Canadian Government regulations which have been passed regarding the trading of walrus hide are altogether for the protection of their own best interests, and on the whole will be glad to cooperate. They will never exterminate such a creature as the fox for their trapping is too dilatory. The supply of bears is sufficiently large to permit them to kill many each season; one reason for this is that the Eskimos do most of their hunting in a relatively small section of the Island, and throughout the rest of the Island, there is virtually untouched breeding-ground for all the wild life of the region.

The tendency on the part of the Eskimos to hunt in well known territory is, in a way, one of the forms of insurance of a constant supply of game; for this means that while one section of the Island will eventually be "shot out" of some kinds of game, the rest of the country will at the same time have remained more or less untouched, and when the Eskimos decide to move to another section they will give the country they have left a chance to become restocked with the various animals.

At the present time much of the South Bay region has but few bears and caribou. The natives continue to hunt here, however, because the supply of foxes is good and there is enough in the way of seals and so forth to keep them busy. Every summer White Whales can be taken and there are fish to be caught in nets at the mouths of the rivers.

The greater part of Southampton exists today much as if it had never been touched by the hand of civilized man. In the wilderness stretches of Duke of York Bay, the drama of wild-life is going on undisturbed by the crack of rifles or the snap of trap-jaws. Here the caribou and wolves are working out their own problems of survival, and the bears and seals their special problems.

We have thought a good deal about Southampton as a home for the Musk-ox. Somehow it seems odd that this creature has never lived here. Surely the vast, grassy interior would furnish the animals with a perfect home after they had established themselves, and so far as we can see, the introduction of such an animal would not upset the balance of the *tout ensemble* in any disastrous way. There is enough grass and moss for both Musk-oxen and Caribou to my way of thinking. The addition of another beast upon which the wolves might eventually prey with some regularity could hardly give the wolves a start over the caribou sufficient to lead to the extermination of the latter. The payment of bounty for

wolves would tend to better conditions for the big-game animals, and it is to be hoped that the killing of wolves in this manner will not be carried too far. It is our opinion that once the Eskimos understood that the big Island was being set aside as a sort of sanctuary for themselves, as well as for the animals upon which they live, they would give themselves over happily to the task of caring for their charges, and would insure for the world the preservation of a vast area where the handsome features of the Arctic World may be forever preserved.

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Fig. 1



Fig. 2

EXPLANATION OF PLATE VI

Netchek, or RINGED SEAL (Phoca hispida Schreber)

FIG. 1. A "Netchek" emerging from the "seal-hole" for a nap on the ice. Traces of the downy white coat of immaturity are shown on the back. Photograph by the Aivilik Eskimo, Amaulik Audlanat.

FIG. 2. A "Netchek" on the ice. This animal was unable to swim away, because the tide went out while it was napping, leaving it stranded at the seal-hole. Photograph by the Aivilik Eskimo, Amaulik Audlanat.



Fig. 1

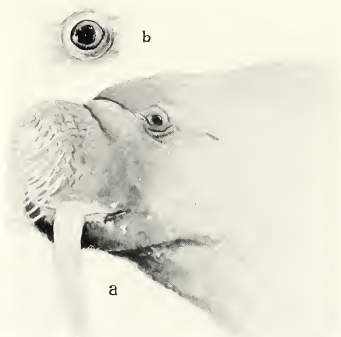


Fig. 2



Fig. 3



Fig. 4

EXPLANATION OF PLATE VII

FIG. 1. Sketch of the face of a female Atlantic Walrus, sketched by the senior author. Bases of nasal bristles pale flesh-color.

FIG. 2. (a) The face of a female Atlantic Walrus sketched in the field by the senior author shortly after the death of the animal, (b) detail of eye of female; male larger and brighter. Eye red about pupil. Natives say red of eye is caused by display of blood-vessels in the white surrounding iris; but I think this is not the case. About one-fourth natural size.

FIG. 3. Face of a newly born Atlantic Walrus, sketched by the senior author at the head of South Bay.

FIG. 4. Husky dogs eating remains of an Atlantic Walrus killed at the Native Point floe.



Fig. 1

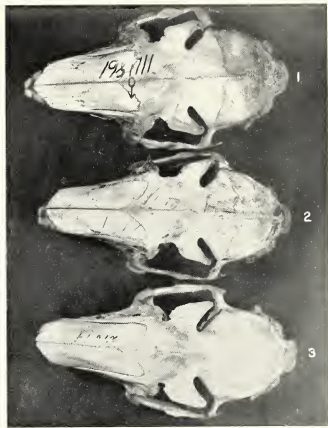


Fig. 2



Fig. 3



Fig. 4

EXPLANATION OF PLATE VIII

FIG. 1. Skull of *Lepus granlandicus* (a) from Greenland, compared with that of *Lepus arcticus* (b) from Southampton Island. The prognathous condition is almost, if not quite, as evident in the lower as in the upper skull.

FIG. 2. Skulls of Arctic Hares compared: 1, *Lepus granlandicus* from Greenland; 2, *Lepus arcticus*, subspecies from Southampton Island; 3, *Lepus arcticus caninus* from Cape Fullerton, Hudson Bay. Note that the prognathous condition of the two upper skulls is about the same.

FIG. 3. (a) dorsal; (b) lateral, view of the skull of *Mastela arctica semplei*, showing the narrowed zygomatica.

FIG. 4. The Skull (without lower jaw) of a Barren Grounds Caribou, which was killed by Arctic wolves. The ends of the antlers have been chewed off by Arctic foxes.

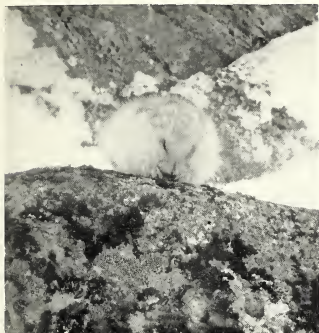


Fig. 1



Fig. 2



Fig. 3



Fig. 4

EXPLANATION OF PLATE IX.

FIGS. 1 and 2. A Richardson's Collared Lemming sunning himself on a rock. This animal is in almost perfect winter-pelage.

FIG. 3. An Arctic Fox in a trap.

FIG. 4. The "seal-hole" of a Netchek, or Ringed Seal. Here the seals come up for air, or, upon occasion, to rest on the ice.



EXPLANATION OF PLATE X

FIGS. 1-4. Upper row: a series of specimens of *Dicrostonyx rubricatus richardsoni* taken in late winter and spring, showing the spring-moult. Fig. 1 is in full winter-pelage. FIGS. 5-8. Lower Row: a series of *Dicrostonyx rubricatus richardsoni* taken in late winter and spring, showing the spring-moult.

FIG. 5 is a sub-adult male; Fig. 6 an adult nursing female. The series shown is arranged chronologically, but displays the remarkable variation in the moult: specimens in full winter-pelage and in almost full summer-pelage may be taken on the same date.

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VOL. XII

PART II, SECTION 2

W. J. HOLLAND, Editor

THE EXPLORATION OF SOUTHAMPTON ISLAND, HUDSON BAY

By GEORGE MIKSCH SUTTON

SPONSORED BY MR. JOHN BONNER SEMPLE

1929-1930

PART II, ZOÖLOGY

SECTION 2. THE BIRDS OF SOUTHAMPTON ISLAND

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PITTSBURGH

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ORNITHOLOGICAL WORK ON SOUTHAMPTON ISLAND PREVIOUS TO 1929

The diaries and reports of the earlier explorers for the most part contain only scanty references to the bird-life of Southampton Island and its surrounding waters.

1610. Henry Hudson and Abacuk Prickett mention birds only a few times. Prickett says in reference to "*Digges, His Island*" [Digges Island, near Cape Wolstenholme] that "in this place bred great store of Fowle" (see Christy, 1894, p. 127). He makes occasional statements concerning "seafowls" [probably gulls] as food, and "Partridge, white as milke . . . , Swannes, Goose, Duck, and Teale," which were seen or captured in the vicinity of their winter quarters in "*Michalmas Bay*." This bay was probably Hannah Bay (see Asher, 1861, p. 108, and Barrow, 1818, p. 188). On July 28, 1611, according to Prickett, "the Boat went to Digges Cape and made directly for the place where the Fowle breed." Here "they took a long pole with a snare at the end which they put about the Fowles neck and so pluck them down." Probably these birds were Brünnich's Murres, a species known to nest abundantly at and near Cape Wolstenholme (see Christy, 1894, p. 152). Since Hudson probably did not actually see Southampton, none of his or Prickett's remarks apply directly to this Island.

1612. The narrators of Sir Thomas Button's voyage make a few statements concerning bird-life. Captain Hawkbridge, who according to Barrow (1818, p. 196) was one of Button's two volunteer companions, states that "Willicks" were killed in great numbers at Cape Wolstenholme. These *Willicks* Christy (1894, p. 169) identified as "Black Guillemots or Dovekies," but I think it more likely that they were Brünnich's Murres, for the birds were evidently very abundant, more abundant than guillemots usually are found to be in the

waters of this region, and decidedly more abundant than the Dovekie, which is a relatively rare bird.

Button's interesting name for the place at which he landed on Coats Island, "Carey's Swan's Nest," suggests that swans must have been seen or secured there. Christy suggests (1894, p. 165, footnote) that "possibly the nest of a wild swan was there discovered by one of his crew named Cary; or the place may have been named after the Earl of Monmouth of that day (whose family name was Carey) . . ." During the winter Button's crew were said to have been "supplied with great store of White Partridge and other Fowle, of which I have heard it credibly reported that this company killed 1800 dozen in the Winter season" (Prickett, as quoted by Foxe and by Christy, 1894, p. 167).

1615. Robert Bylot and William Baffin also wrote of "Fowles" killed near "Digges, his Island," known as "Willicks" (see Christy, 1894, p. 219, and Baffin, as quoted by Markham, 1881, p. 136), but did not, so far as I can find, mention bird-life elsewhere.

1620. Jens Munk records birds only as items of food. At *Munk's Winter Harbor* his crew is said to have had during the winter a "plentiful store of game, consisting of white bears . . . partridges, and other birds" (see Barrow, 1818, p. 231); but, as spring advanced, and scurvy developed among his ranks, "none of them had strength enough to take any of the ducks, geese, partridges, and other fowl which came around them in infinite multitudes."

1631. Luke Foxe's "observations on natural objects" were, as Miller Christy states (1894, p. 292) "often ludicrously vague and unscientific." Nevertheless he made intelligible statements concerning bird-life here and there in his journal. He refers to fowl (perhaps murre) as having been found near Resolution Island. When at or near Cape Southampton, Coats Island, he speaks of the scarcity of "Fowles" (see Christy, 1894, p. 316). At Marble Island on July 29, he saw "great store of Fowle, especially water-fowle." Continuing, he says: "They brought on board two goodly Swannes, and a young Tall Fowle alive; it was long-headed, long-neckt, and a body almost unanswerable. I could not discern whether it was an estridge or no, for it was but pen-feathered. Within 3 or 4 dayes, the legges by mischance were broken and it dyed." Christy, in commenting upon this passage (1894, p. 375) says in a footnote: "Foxe's idea of an ostrich (or 'estridge' as he calls it) in the Arctic regions is very comic. The bird was, no doubt, a young Whooping Crane (*Grus americana*), or perhaps a Sandhill Crane (*Grus canadensis*).¹ The Master calls it 'a young Stork.'"

On August 26, when Foxe was probably near the mouth of the Severn River, he wrote: "this day a N. N. W. wind hath conveyd away abundance of Wild Geese by us; they breed here towards the N. in those wildernesses. There are infinite numbers, and, when their young be fledge, they fly S-wards to winter in a warmer country." (See Christy, 1894, p. 354). Brief mention is made here and there of "partridges" or "ducks or other fowle" at many places in the narrative.

1670. The Hudson's Bay Company, which came into being in 1670, has from time to time since their very earliest establishment in the Hudson Bay region, been interested in gathering data concerning the bird-life at the various trading posts. Some of the Chief Traders or Factors have themselves been deeply interested in ornithology, and have contributed much information and some very valuable specimens to various museums. Thus, in about the year 1835, a specimen of the now extinct Labrador Duck, which may have been taken in Hudson Bay, was presented by the Hudson's Bay Company to the British Museum (see Dutcher, 1891, p. 203). In the diaries of the various Posts, remarks concerning the arrival and departure of migrant birds are regularly made. Sometimes special com-

¹The bird was more than likely a Little Brown Crane, *Grus c. canadensis*.

ment is made upon unusual species which have been seen or shot. I have not, to be sure, examined the diaries of the various Posts along the west coast of Hudson Bay, but those made at Southampton I perused thoroughly, with the permission of the Company, and comments upon these very interesting records will be made later.

I can find, however, no reference to any observations made upon bird-life by George Barlow, David Vaughan, Capt. Knight, John Scroggs and other of the Hudson's Bay Company's employees, who journeyed into the Sir Thomas Roe's Welcome section or to Southampton Island and Repulse Bay.

1742. Captain Christopher Middleton's writings contain no reference to the bird-life of Southampton, so far as I have been able to determine. Extracts from his logs, letters, and some lengthy "Observations" have been published in Barrow's "The Geography of Hudson's Bay" (1852), but among these writings there are no comments on bird-life, other than a brief mention of "partridges" among the creatures he observed changing their color during the winter (see Barrow, 1852, p. 128, Appendix).

1743-1751. There appeared in *Edwards' Natural History* many colored figures of the bird-life in the Hudson Bay Region. "Edwards figured nearly forty species of birds and a few mammals from Hudson Bay, the largest part of which were thus first brought to the attention of the scientific world. His colored figures were accompanied by very good descriptions, but were designated only by English names. Linnaeus bestowed binomial names on most of these species, in some cases referring exclusively to Edwards' figures, but in others citing other authors in addition" (see Preble, 1902, p. 23).

The specimens, upon which Edwards' drawings were based and to which Linnaeus gave his names, according to Richardson (see Swainson and Richardson, 1831) were collected by a Mr. Alexander Light "while at Hudson Bay." I am not sure just where Mr. Light resided or collected this material, but apparently it was not in any of the territories adjoining Southampton Island.

1746. Henry Ellis, writing upon the voyage of the *Dobb's Galley* and the *California*, which vessels navigated the waters to the westward of Southampton, gives us some highly entertaining dissertations upon the birds of the country, some species of which, such as the "brown and spotted *Heathcock*, *Pelican*, White Tail'd Eagle, and great *Horned Owl*," are obviously of forested regions or from country inland from the west coast of Hudson Bay. The paragraphs covering the "*White Partridge*" and the "great *White Owl*" treat of species found at Southampton. They are so interesting that they are herewith quoted in their entirety (1748, p. 38): "The *White Partridge* is of middle size, between our common Partridge and the Pheasant, shaped very much like the former, except that its tail is somewhat longer. In the Summer Season these Birds are mostly brown, but in the Winter they become perfectly white except the outward feathers of the Tail, which are black tipped with white. In that severe Season they repose themselves in the Snow all Night, and in the Morning fly directly up to shake off the Snow. In the middle of the Day they sun themselves, and feed only in the Mornings and Evenings. They breed and continue in those Parts all the Year, which is a great relief to such as inhabit that country. But after all, as the ingenious and accurate Mr. *Edwards* observes, this Bird is not properly a Partridge, but of that kind which we call the Heath Game, and is common to *America* and *Europe*, being found in the mountains of *Italy*, *Switzerland*, *Spain*, &c., but no where in such plenty as in the Regions about Hudson's Bay."

He states (*Ibid.*, p. 40) that there are "several kinds of *Falcons* or *Hawks*, and other Birds of prey."

Concerning the Snowy Owl he writes (*Ibid.*, p. 40): "The great *White Owl*, of a bright shining Colour, so as scarce to be distinguished from the Snow, is common here likewise, and continues the whole Year through in this Country, where it is frequently seen flying by Day, and preys upon the White Partridge."

Charles Swaine, or "Drage" who also wrote of the voyage of the *California*, includes in his narrative many remarks upon the birds of the region, especially those found at the mouth of the Hayes River, where the expedition spent the winter of 1746-47. Most of the Natural History notes in Volume I are to be found on pages 173-180, but there are references to birds throughout the narrative. Particularly described are the Partridge, the Pheasant, Hawk and Kite, and the Geese. The plumage and color-changes of the Ptarmigan are discussed at some length (1748, p. 155); and the migrations of Geese are noted (*Ibid.*, pp. 152-155). In Volume II there is a considerable discussion of ducks and the methods used in decoying them (*Ibid.*, p. 21); a note as to the time Ptarmigans begin to show their "Summer Feathers" (*Ibid.*, p. 9); a good description of the Snow Bunting (*Ibid.*, p. 60); and a statement concerning the arrival of certain spring birds (*Ibid.*, p. 8).

1752. Joseph Robson's account of his six years' residence at Hudson Bay (from 1733 to 1736 and 1744 to 1747) includes some observations on the larger birds and mammals, but these apply chiefly to the Fort Churchill and York Factory regions.

1769-1772. In Samuel Hearne's various journeys from Fort Prince of Wales [Churchill] to the Arctic Ocean, he did not pass near Southampton, but many of the comments made in the section of his volume devoted to Natural History (1795, pp. 358-458) apply to birds found likewise in the Southampton region; and they are of great interest to the student of Arctic bird-life.

1784?. "Mr. Hutchins, an officer of the Hudson's Bay Company, who spent many years on Hudson Bay, mainly at a trading post at the mouth of Severn River, wrote a short time previous to 1785 a manuscript account, entitled *Observations on Hudson's Bay*, which contains many notes on the habits of the birds" (see Preble, 1902, p. 24). While this manuscript does not treat primarily of Southampton, it does, nevertheless, discuss the migration of certain forms which reach Southampton. The facts presented by Hutchins found their way into the works of such authors as Latham (1781), and Pennant (1785).

1819. In John Ross's voyage of discovery in His Majesty's ships *Isabella* and *Alexander*, in the Baffin's Bay region, not much attention was paid to birds, but in the report on the voyage there is included an *Appendix*, which contains an article on the birds and mammals observed about Baffin's Bay. The author of the article is not named. Many of the species mentioned are also to be found on Southampton (Ross, 1819, pp. xlviii-lx).

1821. In Captain W. E. Parry's second voyage, on which he visited the Southampton region and first navigated Frozen Straits, many observations on bird-life were made, and these are to be found throughout the report published in 1824. The report covering his first voyage to the Arctic Seas in 1819-20, contains an interesting *Appendix*, which treats rather fully of several species of birds, such as the "Eider Duck (*Anas Mollissima*), Tern or Sea Swallow (*Sterna Hirundo*), Foolish Guillemot or Loon (*Colymbus Troille*), Greenland Dove (*Colymbus Grylle*), White Partridge (*Tetrao Lagopus*), Snow Bunting (*Emberiza Nivalis*), Boatswain or Arctic Gull (*Larus Parasiticus*) and Sabine Gull (*Larus Sabina*)," all of which occur at Southampton. The "Zoological Appendix" to the report on this voyage, prepared by John Richardson, appeared in 1825. The following notable references are made to the bird-life in and about Southampton in the narrative.

August 1, 1821: Skins "in a prepared state taken from the throat of the *colymbus glacialis*"

were noted in possession of Eskimos. They had not yet seen the species in life (1835, p. 27).

August 12: "We remarked that scarcely in any part of the polar regions previously visited, had we seen fewer birds than for some days past; a solitary glaucous gull, a hawk, and a boatswain [Parasitic Jaeger?]" being all that had been noticed (*Ibid.*, p. 35). They were then along the eastern side of Duke of York Bay.

August 17 [near Cape Welsford]: "a splendid specimen of the *colymbus arcticus*, and also a red-throated diver (*colymbus septentrionalis*) were obtained by the gentlemen of the *Hecla*. The former, though very wild, were numerous, as were also plovers of two kinds, the *charadrius pluvialis* and *hiaticula*" (*Ibid.*, p. 43).

August 21 [in the region of Repulse Bay]: "we saw . . . some ducks, dovebies, knots (*tringa cinerea*), snow buntings, and a white owl; and a few ptarmigan . . . were killed" (*Ibid.*, p. 56).

1824. Though Captain George Francis Lyon, who sailed in His Majesty's ship the *Griper*, did not write much concerning birds in his journal, some of his entries are exceedingly interesting. The outstanding observation is that on the nest of a Snow Bunting found on one of the islands in Sir Thomas Roe's Welcome. The account, for August 29, 1824, reads:

"Near the large [Eskimo] grave was a third pile of stones, covering the body of a child, which was coiled up in the same manner. A snow buntin had found its way through the loose stones which composed the little tomb, and its now forsaken, neatly built nest, was found placed on the neck of the child. As the snow buntin has all the domestic virtues of our English red-breast, it has always been considered by us as the robin of those dreary wilds, and its lively chirp and fearless confidence have rendered it respected by the most hungry sportsman. I could not, on this occasion view its little nest, placed on the breast of infancy, without wishing that I possessed the power of poetically expressing the feelings it excited." (1825, pp. 68-69).

Sir John Barrow, in commenting in footnote on the finding of this "buntin" nest, writes (1846, pp. 220-221): "On reading this passage to an accomplished lady, she said she felt a desire to try what *she* could do with so interesting a subject in the way wished for by Capt. Lyon, and produced the following lines:—

"TO THE SNOW-BUNTING.

Sweet bird! The breast of innocence
Hath fadeless charms for thee;
Although the spirit long has fled,
And lifeless clay it be;

Thou darest not to dwell with death,
Secure from harm or ill,
For on an infant's heart thy nest
Is wrought with fearless skill.

And, like our own familiar bird
That seeks the human friend,
Thou cheers't the wandering seaman's thoughts
With home, his aim and end.

GEORGIANA."

At Leyson Point, on August 24, according to Lyon's journal, they saw "sea-horses," and "near the numerous shallow lakes, were a variety of the usual beach-birds, and a few pin-tailed ducks" (1825, p. 50-51).

Near Harding Point, north of Cape Kendall, on September 12, the men who went ashore killed "fourteen eider and pintail [Old-squaw] ducks in a moulting state" (*Ibid.*, p. 95).

1836. There is no doubt that Captain George Back and his crew, who sailed and drifted about the eastern and northeastern shores of Southampton for the entire winter of 1836-37, saw some very interesting birds; and their observations on the wintering forms of the open floe would be of great interest; but there are no references whatever to bird-life included in Sir Thomas Barrow's account of this remarkable voyage. Apparently they did not even kill any birds for food!

1846. In 1846 and 1847, Dr. John Rae journeyed from York Factory to the Arctic Coast, wintering at Repulse Bay, not far north of Southampton. In his narrative of this journey appear many notes on the birds and mammals of the region and the *Appendix* includes a nominal list of the eighty species of birds collected (1850, pp. 201-204). Most of the birds preserved from the expedition are said to have been collected at Repulse Bay, and are still in the British Museum.

I have not seen the region of Repulse Bay, to be sure, but the species accredited to this place in the British Museum's Catalog of Birds as collected by Dr. Rae, include so many, which I did not find on Southampton and which seem to be of distinctly more southern localities, that I am led to wonder whether some mistake has not been made in supposing that these collections all came from Repulse Bay. Such species as the "Black-throated Loon," Mandt's Guillemot, Old-squaw, Northern Eider, Brant, Snow Goose, Red Phalarope, Knot, Purple and Pectoral Sandpipers, Sanderling, Hudson's Godwit, Semipalmated Plover, Ruddy Turnstone, Rock Ptarmigan, White Gyrfalcon, Snow Bunting, and Lapland Longspur are to be expected, to be sure, for they are species characteristic of the region; the White-fronted Goose and Stilt Sandpiper might be expected to come in occasionally from the west; but the Horned Grebe, Red-breasted Merganser, Green-winged Teal, Surf Scoter, Wilson's Snipe, Solitary Sandpiper, Buff-breasted Sandpiper, Richardson's Owl, Hawk Owl, Smith's Longspur, and Tree Sparrow, all of which are said to have been taken at Repulse Bay, seem somehow to belong farther south, in wooded country. Occasional stragglers are to be expected anywhere, of course, but one would scarcely expect to find so large a number of stragglers as this in a comparatively short sojourn in any boreal region. There is a possibility, it seems to me, that much of the material, which Dr. Rae collected in more southern latitudes, has erroneously been accredited to Repulse Bay. I find in this connection that Preble (1902, p. 26) says: "A few small woodland species, recorded in the British Museum Catalog of Birds as taken at Repulse Bay, were probably collected further south during the early part of the expedition." The plants procured on this expedition are stated definitely to have been "collected on the coast between York Factory and Churchill, and in the neighborhood of Churchill."

In going over Dr. Rae's journals I find many interesting remarks concerning the bird-life of Sir Thomas Roe's Welcome, and of Melville Peninsula. These references give us a clear idea as to the dates of fall departure for some species, and are of great value, when compared with data gathered on Southampton. Rae knew birds well. His comments on the young of the Lesser Snow and Blue Goose (*Ibid.*, p. 69) are well worth considerable study.

1859. Andrew Murray wrote a paper, which was published in the Edinburgh New Philosophical Journal, based on a collection of birds and mammals gathered principally along the west coast of Hudson Bay.

1865. Captain Charles Francis Hall, who remained in the region of Repulse Bay from 1864 to 1869, actually visited Southampton Island in June, 1865. He landed on a small

island not far from Cape Frigid and, while he is known to have taken what observations he could on the coast-line, his journal includes no remarks pertaining to the bird-life. His diaries in general, however, include much matter relating to the birds and mammals of the region, especially the game.

On August 20, while the *Monticello* was heading westward from Resolution Island, "Hall and Eskimo Joe shot a number of *okpas*, the white web-footed sea-fowl [probably Brünnich's Murres] so often found clustering on Arctic cliffs. The petularks, dove-kies [perhaps Mandt's Guillemots] proved too shy" (1879, p. 49).

In speaking of winter game (*Ibid.*, p. 71) he mentions the "snow partridges. Flocks of these birds, in their winter dress, snow-white, except their tail feathers, were found in numbers on the sea-shore, after each fall of snow. In the depth of winter they are scarcely distinguishable from the snow at a distance of 10 feet." An interesting drawing, which is not signed so far as I can see, illustrates this paragraph. The legend of the picture reads: "Ptarmigan (*Tetrao Lagopus*).". The birds are shown in winter plumage. One of the six birds is cackling, and two are feeding on the blades of grass or twigs, which protrude from the snow. It is possible that the drawing was made from a photograph, as indeed were many of the illustrations in the volume.

An unusual method of "tiring out" ducks is described (*Ibid.*, p. 103). Here we are told that the natives pursue their victims in *kayaks*. "A flock which is swimming is approached by the hunter in a *ky-ak*, when most of them take alarm and fly away, but some dive down. The hunter rapidly follows in the probable direction in which the now submarine ducks are swimming, and the instant that one appears above water, it is frightened down by shouts and antic tricks in the way of motions. This one is selected as the victim or prize, and, as the hunter gets near it, he sees and follows it through the clear water. As often as it comes up to breathe, his shouts and motions follow, and thus the pursuit is made till finally the poor duck is dead."

On March 6, 1865 "four flocks of eider-duck (*Anas mollissima*)" were seen, which they estimated contained 1,000 each, the males predominating. Hall notes as of interest to naturalists, their wintering in very large numbers "in waters of such high latitude as the Welcome" (*Ibid.*, p. 151).

On June 25, 1865, "Ou-e-la [an Eskimo] brought in . . . several pin-tail ducks [Old-squaws], with their eggs, which were of a greenish cast, but smaller than those of the Eider." This was on "Oog-la-ri-youk" Island, just across Frozen Strait from Cape Frigid. Observations on the bird-life appear in subsequent chapters, but these do not so closely apply to the region of Southampton as the above.

1893. During Captain George Comer's whaling excursions to the Island between the years 1893 and 1920, he observed many interesting birds and mammals. It is regrettable that more complete data were not preserved. Comer's collections, many of which were valuable, were chiefly of ethnological interest. I have had the pleasure of studying all of Captain Comer's diaries. That of 1905, covering a visit to the region of Manico Point on Southampton Island is of special interest to the ornithologist. Here are characteristic notations concerning the birds observed:

"May 20 [1905]. Eider Ducks quite plentiful." These were, apparently, Northern Eiders.

"May 22. Ducks known as South, South-west [Old-squaws] were first seen to-day."

"May 24. [Northern] Eider Ducks beginning to mate."

"May 28. First King Eider for season."

"June 30. . . . the men got 1 loom Egg two gulls eggs and several small eggs two King Eider ducks eggs were got also."

"July 1. . . . got 6 swans eggs and 2 loom eggs."

"July 3. . . . got 3 swans eggs."

"July 5. Got a nest of King Eider ducks."

Captain Comer collected some ornithological material for the American Museum of Natural History in New York, including a habitat group of Whistling Swans, which is on display at the present time. According to a letter from Captain Comer, dated November 24, 1930, other specimens also were deposited in this Museum, but Dr. Chapman does not seem to have any record of these. The Aivilik Eskimo, Amaulik Audlanat, remembered Captain Comer's interest in specimens, but did not recall exactly what birds or birds' eggs had been collected by the Eskimos and turned over to him.

1900. Early in the summer of 1900, Edward A. Preble and his brother, Alfred E. Preble, made a special study of the bird-life of the west coast of Hudson Bay, preparatory to publishing a very useful fauna of the Hudson Bay Region. Together they made their way down the Nelson River and eventually came to Fort Churchill. Here Edward A. Preble left his brother and went on northward "well into the Barren Grounds," a trip that required at least three weeks. While Preble did not touch Southampton Island, nor even reach the western shore of Sir Thomas Roe's Welcome opposite the Island, nevertheless the country which he visited is in many ways very similar to that found on Southampton and nearby territories; so his remarks upon the various species of birds are of great interest to us. Preble's report (North American Fauna, No. 22) has been of great assistance to me, especially the remarks on the Life-Zones in the region and on the previous scientific work done, and the very comprehensive Bibliography. All in all, it is the most authoritative paper, which has thus far appeared on this relatively little known portion of the North American continent. The references to Southampton Island are so very few, that the necessity for a closer investigation of the fauna of the Island is very apparent.

1904. Decidedly the most important ornithological work on Southampton prior to 1929 was that carried on in mid-June, 1904, by A. P. Low and his associates. Low voyaged by whale-boat from Whale Point to the western shore of Southampton Island in the vicinity of Cape Kendall, where he arrived on June 17. He spent a week on the Island and made the first relatively representative collection of bird-skins and eggs taken from the Island. He found bird-life abundant. He says: "The shores and islands of these lakes [near Cape Kendall] are the breeding grounds for a number of rare birds, among which may be mentioned Sabine's Gull, Arctic Tern, Whistling Swan, Hutchen's Goose, Snow Goose, Jager, Little Blue [Brown] Crane and Red Phalarope" (1906, p. 34). An annotated list of the species encountered on Southampton and elsewhere among the Arctic Islands, where the *Neptune* journeyed, is to be found as Appendix II in *The Cruise of the Neptune*. According to the introductory note to this Appendix "a large number of the . . . species were collected and preserved by Mr. Andrew Halkett, naturalist to the expedition" (p. 314). I have not ascertained, however, that Halkett himself visited Southampton. This list is virtually the sole basis for the mention of Southampton as part of the range of many of the Arctic birds in such publications as Bent's *Life Histories* (1919, etc.), and the Check-List of the American Ornithologists' Union (1910). I found the list of great help to me in my work.

According to the introductory note to this list, Mr. Halkett was "assisted in the identification by Prof. Macoun and the Rev. Mr. Eifrig." Eifrig himself published a similar list (1905, pp. 233-241) wherein the annotations are more extensive than in Low's report. He

includes remarks upon the food-habits, coloration of downy young, and measurements of eggs collected. Low's list includes forty-three species, Elfrig's fifty-one.

1902. Captain John Murray, a whaler from Aberdeen, who wintered on Southampton for three consecutive years (1902-1905), observed the bird-life with interest, but unfortunately did not keep many notes concerning the species he encountered. He found great numbers of swans nesting at Cape Low, when he landed there in August, 1902; and during the fall of that year saw quantities of white and blue wavies. He tried to save certain eggs and bird-skins, among others those of ptarmigans and Snowy Owls, but these were destroyed before he left the Island. I had many pleasant conversations with Captain Murray on board the *Nascopie* and jotted down some of the recollections he gave me. He spoke at length concerning loons, sandpipers, geese of several kinds, ptarmigans, Snowy Owls, curlews, phalaropes, and others species. He described very carefully a small yellow bird "something like a canary" which had brownish streaks on the breast, which had been caught alive during the fall of 1902 by one of the Eskimos. This bird was probably a Yellow Warbler. He told me too of the Snow Buntings which nested in his house at Cape Low, in a crevice somewhere between the weather-boarding and the inner sealing.

1916. Captain Henry T. Munn collected a good many specimens of birds and mammals during his two-year stay on the Island, according to Amaulik and others of the Aivilik Eskimos. These specimens I am not able, however, to trace. Munn says nothing about birds* in his paper on Southampton (1919, pp. 52-55), though he refers to many species of mammals; and, judging from caribou remains found in the vicinity of his former headquarters at Seal Point, I should say that he and his comrades did a good deal of hunting while there. It is a pity that data covering Munn's experiences with the wild-life were not preserved.

1922. Dr. Therkel Mathiassen, representing the Fifth Thule Expedition from Denmark, headed by Dr. Knud Rasmussen, investigated principally the Archaeology and Anthropology of Southampton during his six months stay on the Island. He made some biological collections, particularly of plants, reports upon which will be published later. In Mathiassen's paper, which has just appeared, the comments upon the bird-life are of such interest that they are quoted in their entirety here (1931, p. 28): "*Birds*. Both by earlier travellers and Eskimos Southampton Island is described as being rich in birds. Parry mentions from Duke of York Bay geese, *Colymbus arcticus* and *septentrionalis* (diver), *Charadrius pluvialis*, and *hiaticula* (plover), and Lyon *Anas glacialis*, *Charadrius africanus*, *Tringa helvetica* and *lobata*, *Larus glaucus* and *parasiticus*, as well as sandpiper, eider duck, and snowy owl. From the west coast Low mentions: 'Sabine's Gull, Arctic Tern, Whistling Swan, Hutchen's Goose, Snow Goose, Jäger, Little Blue Crane, and Red Phalarope.'

"During our stay on the island, however, we saw surprisingly few birds, but of course it was already in the end of the summer that we arrived at Kûk. During the last week of August we saw there the raven (*Corvus corax*), snow bunting (*Emberiza nivalis*), loon (*Colymbus septentrionalis*), herring gull (*Larus argentatus*), tern (*Sterna* [*Sterna*] *macrura*) and snowy owl (*Nyctea nivea*). On September 8th we saw at Cape Munn large flocks of long-tailed ducks making southwards. On the whole journey across the island during the month of October we saw only three ptarmigan (*Lagopus mutus*) and one Raven, and while at Darkness Lake during the winter only one raven and one snowy owl.

"According to the Eskimos the lake districts in the southwest part of the island abound in web-footed and wading birds; a large number of swans (*Cygnus musicus*) breed there, for

*According to Mr. Hoyes Lloyd (1922, pp. 49-50,) Munn definitely recorded *Branta canadensis hutchinsi*, "*Grus canadensis* or *Grus mexicana*," and *Changula hyemalis* from Southampton Island.

instance, and there are said to be particularly large numbers in the districts round Cape Kendall and Bay of God's Mercy.'

1924. Mr. Sam G. Ford, who built the Hudson's Bay Company Post at Southampton, did not make a collection of birds or birds' eggs, nor has he published any data on the species encountered, but he has kept some very interesting ornithological notes in connection with his official diaries, and these I have consulted carefully with the permission of Mr. Ford and the Company.

Mr. Alfred Copland, who was with Mr. Ford in 1924, and who stayed at Southampton for some time, did preserve a few eggs, "singles," I understand, the present whereabouts of which is not known. In 1924 he collected some "swan and duck eggs." Again he collected a set of three Whistling Swan eggs which were sent out to Mr. W. O. Douglas, of the Hudson's Bay Company, and later presented to the National Museum at Ottawa. Mr. Copland gave me data on a Dovekie and a Tree Swallow, both rare birds for the region, which had been found by the natives at the Post. Mr. John D. T. (Jack) Ford, son of Mr. Sam Ford, also wrote some interesting notes concerning birds in his diaries, and these notes I have consulted. Father P. L. Girard, who was on Southampton from August, 1926, to September, 1927, gave me verbally the recollection of his ornithological observations while on the Island.

The Eskimos themselves, while often careful observers, do not keep diaries of any sort. They remembered many interesting facts about birds, however, and in one or two cases produced remains of unusual specimens which they had saved in years past as curiosities.

Prior to August, 1929, but little careful ornithological work had been done on Southampton Island, or in the vicinity. One well preserved collection had been made during one week of mid-June, 1904, by Low and his associates of the *Neptune*. A few eggs had been collected by occasional whalers, fur-traders, and missionaries. Two useful papers (covering the same collections of specimens) on the birds of the Island had appeared; and some notes had been written in diaries or elsewhere. When I landed on Southampton I had virtually an untouched field of study before me.

In undertaking my year's work I solicited at the outset the help of everyone on the Island. Mr. Ford and his son Jack were to tell the Eskimos of my needs and wishes. I could not speak the Eskimo language at all well, and I had some difficulty in making my work clearly understood. I planned the year's program so as to reach as many parts of the Island as possible, either personally, or through a reliable native. I knew I could not accomplish any finally accurate geographical work, but I did want to see some of the interior, and I wanted, in particular, to visit the little known region of Seahorse Point. I was prepared to preserve natural history specimens of all sorts. The present paper makes available the ornithological results of our year's labor.

THE BIRDS OF SOUTHAMPTON ISLAND

LIST OF SPECIES*

By GEORGE MIKSCH SUTTON

Order GAVIIFORMES.

Family GAVIIDÆ.

Genus GAVIA Forster.

*Gavia immer immer** (Brünnich). COMMON LOON.

I do not know whether the form found along the west coast of Hudson Bay is *G. immer immer* or *G. i. classon* Bishop, the Lesser Loon, which is said to be a bird of the prairies breeding "from North Dakota and northern Wisconsin north to British Columbia and probably Manitoba" (A. O. U. Committee, 1931, p. 2). King (1836, II, p. 21) records the 'great northern diver' from the mouth of the Back River, not far to the north and west of Southampton. Preble (1902, p. 75) records *immer* from Norway House, York Factory, Churchill, and North River, though apparently no specimen was taken. Mr. Ford told me that he saw a loon on Coats Island during the summer of 1921 (or about that year), but that it had no mate and evidently was not a nesting bird. He never saw the species on Southampton.

Mr. James Thom, of the Hudson's Bay Company, gave me an excellent photograph of a loon (the bird had been shot) which had been taken, I believe, at Lake Harbor, Baffin Island. Soper (1928, p. 76) evidently found *G. i. immer* rather common on Baffin Island, and it is surprising that we did not take either *immer* or *classon* at some time during the course of our field-work.

The Aivilik Eskimos occasionally spoke of loons in general, as if they were acquainted with three distinct species. They referred to a "big loon, a little loon, and a middle-sized loon." The "little loon" is plainly the well-known and common *Kokshouk*, the Red-throated Loon. The "big" and "middle-sized" birds may be Pacific Loons of different sizes or ages; or the "big" one may be the present species or even the larger Yellow-billed Loon, *Gavia adamsi* (Gray), individuals of which they may have seen, or even killed, at some time. Unusual birds of this sort, especially large birds, are much talked about when they are taken, and the capture often becomes one of the traditional hunting yarns of the tribe.

Gavia adamsi (Gray). YELLOW-BILLED LOON.

The nearest locality at which this species has been taken is apparently Boothia Peninsula. In speaking of this record Preble (1902, p. 76) says: "Under the name *Colymbus glacialis*, James Clark Ross records three loons, which from his description were undoubtedly of this species, obtained about Boothia during (John) Ross's second voyage (1835, *Appendix*, p. xlii)." Parry's reference (1835, p. 27) to *C. glacialis* doubtfully applies to this species.

1. *Gavia arctica pacifica* (Lawrence). PACIFIC LOON.

(Plate XI, figs. 3 and 4; Pl. XXII, fig. 5)

Eskimo Name: The Aivilikmiut called this common bird the *Kudloolik*. According to Soper (1928, p. 77), virtually the same word is in use among the Okomiut of Baffin Island,

*The nomenclature and order of the present list follows that of the Check-List of North American Birds, published by the Committee of the American Ornithologists' Union, 1931.

*Species given in Italics were not collected by the author, but may occasionally occur on the island.

but he spells it *Kudlulik*. The word is onomatopoeitic; it is an excellent imitation, if spoken in a high voice in a drawl, of one of the most characteristic cries of the bird. In this connection it may be interesting to call attention to what may be an error in identification of this loon at Point Barrow, Alaska, by Murdoch, who says (1885, p. 91), supposedly concerning this species: "Their peculiar harsh cry, "kok, kok, kok," from which they get their name "Kaksau" is to be heard all summer. . ." The Pacific Loon *does* have harsh cries, some of which might be written *kok, kok, kok*, to be sure; but it is the Red-throated Loon which usually gives these cries; and it is the Red-throated Loon which was, on Southampton and at Chesterfield Inlet, called the "Kaksau," or, as I wrote it, the *Kokshouk*, among the Eskimos. Both species, when they occur together, are given to raising a great uproar at exactly the same time, so that the Eskimos themselves sometimes have difficulty in distinguishing the various call-notes. I am certain, however, that the call-notes which inspired the native name *Kokshouk* are those of the Red-throated, and not of the Pacific Loon, since I spent a great deal of time with the birds purposely to determine the types of call-notes which belonged to both species, and which to only one, or the other.

Mr. Herbert W. Brandt tells me that in Alaska the Eskimos with whom he was acquainted called the Pacific Loon the *Ren-nuch-chlik*.

Status: The Pacific Loon is an abundant and widely distributed summer resident all along the southern and southwestern shores of Southampton according to personal observation. It nests on the coastal lakes, usually not more than four or five miles inland. The Eskimos told me that it was abundant in the East Bay region also, but that it was rarer about Duke of York Bay. According to our data it arrives late in the spring, in fact much later than the Red-throated Loon, and it seems likewise to disappear from the lakes earlier in the fall. It is an abundant bird in the region of Coral Inlet and at Prairie Point, where most of my midsummer studies were made.

Fall Records: On August 18, 1929, I had my first satisfactory view of a Pacific Loon in life. I was making my way through a grassy marsh not far from the edge of a narrow lake, when a bird flew over me, its wings fanning the air loudly. Looking up, I saw a big-headed, big-footed loon rapidly flying inland with a small, light-colored fish in its beak. When I moved, the silver-breasted creature wheeled in a wide circle, giving me a view of its broadly spotted back and gray-topped head. As it came over me again, it uttered a loud, deep growl, fairly startling in suddenness and intensity. It circled over me three times, sticking its feet out oddly as it changed the course of its flight, then disappeared in the distance.

I felt that the bird probably had young in a lake nearby, for it was plainly agitated. Just after it disappeared there came from the lake toward which it had flown a mighty din—the clamor of the hungry young; and then, a moment later, a plaintive *ah-hah-wee*, the last syllable high, penetrating, and mournful, the cry of the parent to its mate, which was probably fishing in the bay. This was the sound the Eskimos imitate with the syllables *Kud-loo-lik*.

On August 20 one of the natives killed a handsome male in the Inlet. The specimen was not fat and the stomach was empty. On this date I observed about fifteen pairs of birds. The pairs were often seen together, either resting on the lakes, or flying to and from the salt-water where they fed, or caught food for their young. Their call-notes were chiefly growls and croaks, some of them rather raven-like; and there were no *quacks*, such as the Red-throated Loon utters.

On August 22 I found a pair with their nearly fully developed young in a large rock-rimmed lake about two miles east of the Post. I crawled up on these birds and watched the

young being fed. When I disturbed them, both parents gave a funny high yelp, just before they plunged under the water with their young. This yelp was precisely that of a Husky puppy, when it has been kicked or clouted.

On August 25 I saw two pairs with their young in large lakes at Prairie Point.

On the trip to Cape Low Pacific Loons were seen nearly every day. They were especially common at Hut Point and at Ranger River. Many were also noted at sea, as we made our way along the shoal coast. On September 2 I shot a handsome female, as she was flying inland from her fishing-grounds at the mouth of the Ranger River. In her beak was a pale-colored sculpin six inches long.

The species was noted daily during the first two weeks of September. On the 13th I saw a pair and their fully-fledged young about half a mile inland from the Post. All the birds called a good deal. They were decidedly more wary than the Red-throated Loons. The young must have made their way out to sea sometime in the middle of the month. On September 17 I saw a pair and their dark-colored offspring in the middle of a bay just north of Native Point. Several, both adults and young, were seen at and near Native Point, Leyson Point, and Seahorse Point on September 19, 20, and 24 respectively. On the 27th a few were seen near the little Kikkuktoyak Island. The species was not seen after this date.

Spring Records: The *Kudlookik* was not noted until June 15 in the spring of 1930. On this date two were seen flying about an ice bottomed, salt-water 'lake,' not far from the Post. They gave their usual growls, as they flew about; they appeared to be mated. On June 16 I saw two pairs swimming in large lakes where the water was deep and the shores rocky. On June 17 Father Fafard found a nest, which he thought to be ready for eggs. On June 18 I collected a male at the mouth of the small stream west of the Post in the deep pool which the debouching waters had made in the saline ice. Here loons and other water-birds were wont to feed and rest. The gonads of this specimen were much enlarged. On the same date I took a mated pair at the base of Itiuachuk. These birds were swimming together in one of the sand-bottomed meadow lakes. As I came up they dipped their heads in the water, swam along with necks lying along the surface, giving their deep growls and playful barks, and the *kudlookik* cry, which reminded me strangely of a whip-poor-will's song given with a grotesque drawl. The ovaries of the female contained an egg about the size of a golf-ball. The nest, which was situated along the highest part of the bank, was apparently ready for eggs; as ready, that is, as the nest of a loon ever is.

A female collected on June 21 had eggs about the size of a hen's egg in her ovaries. On June 27, an Okomiut boy, Noah, brought in a set of fairly fresh eggs from Koodlootok River. On July 1 Jack Ford found a nest containing two eggs, one of which was much slenderer, browner, and less spotted than the other. The great difference in shape, size, and color which sometimes appears in the two eggs of this species, has led the Eskimos to believe that the large eggs produce male birds and the small ones females. This belief might be worth investigating; but I had no opportunity to test its accuracy.

On July 2 Keetlapik (an Okomiut native) gathered for food quantities of the eggs of terns, gulls, geese, and loons. Six of these were of the present species. He let me blow out one set which he had kept separate. They were somewhat incubated. On the same date I shot an incubating female upon one of the larger lakes, but, though I walked entirely round this lake, I found no nest.

On July 12 I found a well-built nest on an island in a large lake, where a colony of about forty pairs of Arctic Terns also were nesting. The nest of the loon was a bare depression

among the grass at the edge of the water, the cup possibly ten inches above the water. The island, which was about ten rods long and a rod wide, was grassy, and lay perhaps a hundred yards from the shore. The water about the island was waist-deep.

On July 14 I found a nest with one egg at the edge of another small, grassy island in a large lake, where a Northern Eider, an Oldsquaw, and perhaps ten pairs of Arctic Terns were nesting. The cup of this nest was about four inches above the water, and was almost completely surrounded by grass a foot high. The parent bird was seen incubating with head stretched out in front of the body and lying close to the ground. While I was photographing this nest, one of the loons suddenly thrust its head out of the water nearby, and gave me a wild, fierce stare, its garnet eyes blazing. I am not sure whether this egg was an incomplete set, or whether one young had already hatched and was abroad with one of its parents. (See Pl. XI, fig. 3).

On July 16 I shot a female with incubating patches in the belly plumage. The ovaries were somewhat enlarged. In the stomach were remains of small fish and some quartzite pebbles.

Newly hatched young were first observed on July 18. If we may infer that the first set found by Noah on June 27 were laid at about an average date, and had been incubated about a week, then the period of incubation in this species must be about twenty-eight or twenty-nine days. I did not make certain that both sexes incubate, but I believe they do.

On July 18 at a lake inland from Prairie Point, where great numbers of Arctic Terns and Sabine's Gulls were nesting, we found also a pair of Pacific Loons and one newly hatched young bird. Jack Ford showed me how the Eskimos call these baby birds to them. Dipping his hand into the water and flicking the surface gently, he attracted the creature's attention. Soon it began paddling toward us. We caught it easily in the hand, without having taken one step toward it. Perhaps it thought the splashing was a signal from one of its parents. The old birds circled about close by, croaking and growling savagely, their narrow wings whistling; and sometimes in alighting they struck the surface so forcibly that thin, glistening sheets of water ten feet wide spread out in front of them. They did not, however, feign injury of any sort, nor did they flop about at our feet trying to attract attention. The young bird swam well, but dived poorly.

On the following day at Koodloutok River I came upon another family-group. Here a downy young bird was swimming between its parents in the middle of a large lake. The parents growled, flew about several times, and gave themselves over to fits of wailing. When I finally caught the young bird, the adults became frantic; darting back and forth through the water and standing up oddly, with heads drawn downward against their backs as they beat their wings fiercely and churned the water with their feet.

On July 22 I found two small and exceedingly pretty young at the very edge of a deep lake. The parents, upon seeing me, yelped wildly, dived with a big splash, and reappeared in the middle of the lake in an amazingly short time. One of the offspring, probably the older, followed; it comically tried to dive, kicking its big feet alternately and making all sorts of splashes and ripples. But it could not get more than an inch or two under water, and sometimes it could not get its tail under. It did not seem to use its wings at all in progressing under water.

The other young bird, with a most engaging expression on its face, paddled innocently toward me, looking straight into my eyes as it came. At every move I made or word I spoke it came closer. Finally I reached my hand out to it and lifted it from the water. It lay on my palm quietly and pecked at my fingers as if in play. It gave a thin, high squeal, not a

peep. When I set it once more in the water it refused to leave, and followed me as far as it could. Small wonder that a collector sometimes finds it unnecessary to collect very desirable material! On July 24, when I revisited this lake, I found both these young birds more than usually wild, the smaller being, if anything, the wilder of the two.

On July 28 in a broad lake about five miles inland from the Post, I watched four Herring Gulls tormenting a pair of Pacific Loons and their two small young. I am not certain that these gulls were trying to capture the young loons, but they made attack after attack, and caused the birds to keep up a continuous thrashing about.

Annual Routine: The Pacific Loon arrives rather late in the spring; much later than the Red-throated Loon; but earlier than the Brant. The birds are usually mated by the time they arrive, and they immediately undertake their nesting duties. They return to the same lake year after year, if they are not disturbed, and often to the same nest, which they renew, or reline to some extent. The nest is usually situated at the edge of a small island in a large lake. It is a mere depression in the humus, or in a pile of débris, and it is usually wet. The eggs are practically always two. The period of incubation is about thirty days. Probably both sexes incubate.

The young are fed upon fish, which are caught in the salt-water. This means that the parents sometimes have to fly four or five miles, or more, to reach a fishing-ground. The young stay in the home lake until late summer, when they make their way out to the bays and inlets with their parents. How they get to the salt-water is a question which remains to be settled. The adult birds do not undergo any sort of post-nuptial moult, while they are at the nesting-lake; but they probably do so, as soon as the young are safe in the sea. Both young and old birds leave for more southerly latitudes well before the cold weather sets in, usually even before the smaller Red-throated Loon departs.

The enemies of the Pacific Loon on Southampton Island are not many. Jaegers, gulls, and foxes occasionally steal their eggs and young, and the Eskimos gather all the eggs they can find near their encampments. But the adult birds are not molested by any bird or mammal, or as a rule by the Eskimos.

Fleshy Parts: The eyes of the newly hatched young are dull gray-brown, with small, bluish pupils. The bill is dull blue-gray, lighter on the tip. The feet are dull greenish gray. The eyes of the young bird remain brown probably until the first breeding plumage is attained. In the adult the eyes are a striking red, of a shade deeper and more crimson, and less red-orange, than in the Red-throated Loon. The pupil is surrounded by a very narrow, purplish-gray ring. The bill is blackish, with the base of the lower mandible pale purplish gray. The feet are blackish, with the inside of the toes and tarsus very pale flesh-color, almost a dead or greenish white.

Other Records: Parry (1828, p. 43) records the capture of a "splendid specimen of the *colymbus arcticus*" near Cape Welsford on August 17, 1821. He speaks of the species as "very wild," though "numerous." Specimens from Winter Island, Melville Peninsula, and Repulse Bay, the last probably taken by Dr. John Rae, are recorded in the British Museum Catalogue of Birds. Preble (1902, p. 76) found the species abundant "on the shallow ponds on the tundra" below Cape Eskimo, August 4 to 13. He further says: "The old birds were often seen flying to and from the Bay, where most of their food seemed to be secured. The howl of a wolf, or any unusual sound, was generally followed by a chorus of their wild, weird calls, lasting for several minutes."

Eifrig (1905, p. 234) says: "Common in the northern part of Hudson Bay, but not seen much elsewhere [in the Arctic Archipelago]; not seen in winter. Breeds abundantly on

Southampton Island in the manner of the Common Loon. Stomach contents: stones and fragments of shells, but no bones." Low (1906, p. 314) says: "Skins and eggs collected at Fullerton and Southampton island, Hudson Bay. Very common in the waters of Roe's Welcome, especially on the east side along Southampton island. . . Breeds abundantly on Southampton; nests built on islands or along the swampy edges of ponds not far from the coast. Feeds in the sea." Hantzsch* (1914, p. 139) found the species common and breeding at Netilling Lake, Baffin Island. Bent (1919, p. 71) includes this whole region in the *breeding-range*.

Mathiassen did not record it in the Duke of York Bay region during the fall of 1922. Mr. Ford noted it as abundant on Coats Island during his residence there. Soper (1928, p. 77) found it breeding in many parts of Baffin Island. Mr. Swaffield did not take a specimen at Mansel Island, during 1929-30. We recorded it as rather rare in the region of Chesterfield Inlet during the late summer and fall of 1930 (1931c, p. 156). Captain Comer took a set of two eggs on Southampton Island on July 14, 1904, and another set of two on July 1, 1905.

2. *Gavia stellata* (Pontoppidan). RED-THROATED LOON.

(Plate XI, figs. 1 and 2)

Eskimo Name: Both Aivilikmiut and Okomiut called this species the *Kokshouk*, or as Hantzsch has written it (1928, p. 88), the *Kaksau*. This word is so much like *Koksoak* or *Kokjoak*, which means 'river' or 'big river,' that at first I thought it must describe the loon as some sort of a river-bird. I am now of the opinion, however, that *Kokshouk* is an onomatopoeic word, imitating one of the characteristic cries of the courtship period.

Part of the region of East Bay on Southampton Island is called by the native name *Kokshouktok*. It was explained to me that this word meant not 'place where there is a big river' but 'place where there are many *Kokshouk*.' Turner (*cf.* Bent, 1919, p. 79) found that the Nascopie Indian name of the species at Fort Chimo, Ungava, was *Kashagat*, "derived from its note." Mr. Brandt tells me that in Alaska he heard the Eskimos calling the Red-throated Loon the *Koocheunik*.

Status: A common and widely distributed summer resident, which arrives as soon as the lakes thaw, and which remains until even the salt-water bays and inlets begin to freeze. We found it scarcely so common as the Pacific Loon in the region of Coral Inlet and Prairie Point. At Cape Low, however, it was the commoner of the two species, and was according to the Eskimos similarly abundant in the region of East Bay.

Fall Records: On August 19, 1929, I found a pair with half-grown young at a small pond, perhaps one hundred feet wide and three hundred feet long, which lay just to one side of a large, shallow lake. The old birds made considerable commotion as I drew near, quacking loudly and swimming back and forth as they looked at me first with one eye, then with the other. They moved their necks in a snakelike manner. When I came to the edge of the pond they took off gracefully, paddling fiercely with much splashing, for about ten yards, then slowly rising. They circled about me, continuing and increasing their quacking cries, and sticking out their great feet comically as they undertook to make a quick turn. They were obviously afraid of me, yet they returned to their young while I was standing near, hitting the water with a mighty splash, and bouncing clear of the surface with a graceful forward spring, before settling to their normal, swimming position. The young dived

*Ornithological Journal. Notes during a Journey in Baffin Island. By Bernhard Hantzsch. *Sitzungsberichte der Gesellschaft naturforschender Freunde zu Berlin, Jahrgang 1914, Nr. 4, pp. 129-165.*

well. The water was so shallow I could see them as they flashed across the pond like quickly moving shadows, shoving themselves along with mighty strokes of their broad feet. They did not use their wings under water. They did not cry out, even while their parents were most noisy. Their bodies seemed to be covered entirely with down, although they must have been almost half as heavy as the adults.

On August 20 I found another family-group at a lake near Seal Point. The young birds stayed together in the deepest part of the lake. They held their heads high, with bills pointed decidedly upward. As I drew nearer they bent their necks, dipped their bills nervously in the water, throwing out little splashes, and then suddenly slipped under. On this date I collected an adult male, which was not fat.

I eventually located along the north shore of Coral Inlet about fifteen pairs of *Kokshouk*, with their partly grown young. The old birds fed in the Inlet, especially at the mouths of the several streams, where they caught small fish. These were brought to the young entire, held crosswise in the mandibles in a manner similar to that of the Pacific Loons, which nested nearby. When the parents returned with food, the young set up a quacking and groaning, which was laughable to hear. In most of these uproarious clamorings the adults joined with the young, adding to the racket their deeper, more throaty groans and those wild whoopings, which Mr. Harrison Lewis has called "college yells." Frequently one parent remained with the young until the other returned with food; but the baby birds spent much of the time alone on their home lake, quietly awaiting the familiar form, or the whistling of slender wings. When an old bird returned with a fish, it often dropped downward from the sky in an amazing series of zig-zag coastings made at breath-taking speed. At such times the feet were stuck out and forward as brakes, and the head was somewhat drawn back. Even though the bird thus tried to break its fall, it usually hit the water with a loud *smack*, and sent the spray flying.

During latter August I saw families of Red-throated Loons at Coral Inlet, Prairie Point, Seal Point, Four Rivers, and Ranger River. Frequently, as at Hut Point on the evening of August 31, I observed young Red-throated and Pacific Loons in adjacent lakes, and noted that the clamor, which accompanied the return of the parents, was so loud and confusing, that it was all but impossible to tell which species was responsible for certain noises. I finally determined, however, that clean-cut *quacks* were given only by Red-throats and that growls were given only by the Pacific Loons, while both species gave peculiar moans and whoops, which had much the same wild melancholy quality. On September 1 at Cape Low a Red-throated Loon shouted *cut, cut, cut, dah, ah, hay*, over and over again, with much the inflection of an excited barnyard hen.

On September 2 near Ranger River I collected one of two half-grown downy young, and an adult. These birds were swimming about in a narrow pond, which lay between two long, rather low gravel-ridges. The crop and stomach of the adult bird were packed with fish; yet it had brought a six-inch sculpin to its offspring just a moment before I shot it. Perhaps these loons regurgitate part of the food for their young, and bring the whole fish in their bills only because they cannot conveniently swallow it.

On September 4 at Four Rivers, about two miles inland, I saw two nearly fully fledged young in a long, shallow lake. Though these birds still seemed to have some down on the head and neck, their breasts were clearly white. They gave low, deep groans, and laid their heads and necks at full length ahead of them in the water. I watched the parents return with fish in their bills and feel sure that no regurgitation of any sort took place.

On September 6, I collected an adult female as she was flying out to sea. On the breast

of this specimen was a single black feather. She was not fat and her stomach was empty.

On September 8, while yet at Four Rivers, I found three families of *Kokshouk* at inland pools. All the young birds seemed about ready to fly, but I could not get one of them to spread its wings. The actions of the excited parents were exceedingly interesting. Sometimes they would sink far into the water, and swim rapidly along, leaving a deep furrow behind them. Then again they would leap now this way, now that, splashing the water furiously as they attempted to attract my attention. They did not once act as if they were crippled. Frequently they flew up from the lake to circle about three or four times, then returned in a spectacular plunge from the sky, their heavy bodies swaying from side to side as, with wings stiffly set and feet stuck out, they struck the water either full on the breast or on one side, leaped forward buoyantly, and sank to rest with a loud *quack* or *squawk*. Thereupon a loud, throaty wail brought the young birds quickly to the side of the parents.

The young birds at Cape Low and Four Rivers were so well developed, when last observed on September 8, that they must have made their way out to salt-water within a few days. In the vicinity of the Post, however, where many eggs had been taken by the natives and where, therefore, there must have been many much delayed broods, some of the young were yet quite unable to fly even as late as the middle of September.

On September 17 near Seal Point I saw two young in a little lake, which was all but frozen over. The birds swam about in a round open pool about fifteen feet in diameter. The parents had considerable difficulty in making a landing here, and sometimes struck the ice with sufficient force to break it. They had even more trouble in rising; and I doubt if they could have got away at all had the rather stiff breeze from the northwest not lifted them as they flew into it. These young birds groaned and wailed considerably, whenever I stood at the edge of the lake. They stretched their necks out full-length in the water or oddly writhed them about. They dived well. One appeared to be considerably older than the other, for the lower part of the neck and chin were silky white; whereas in the other bird this region was entirely covered with smoky gray down. I could not continue to watch these birds because of my leaving on a two-week trip to the eastward. The natives told me they finally *flew* from the pond and reached the salt-water safely on September 23.

My latest fall records for the Red-throated Loon are as follows: September 18, one at Native Point, in an inland lake; September 19, about twenty in a loose flock, at sea, south of Native Point; September 20, a few near the mouth of the Anderson River; September 21, 22, and 23, two birds, perhaps a pair, noted in one of the coves near the Semple Islands.

I wanted to see the young birds flying from the home lake to salt-water, but I never witnessed this first flight. Natives told me that the young birds practised flying by scuttling back and forth on the lakes beating their wings and kicking their feet. For a time I wondered whether they might not make their way overland from lake to lake, but I think this rarely, if ever, takes place.

Spring Records. I gathered no data which lead me to believe that the Red-throated Loon ever winters in the open waters of Hudson Bay. The natives told me they had never seen a *Kokshouk* at the floe in mid-winter. It sometimes returns very early in the spring, however, to the water at the edge of the ice; and it makes its way in to the nesting-grounds as soon as the lakes have thawed.

On May 25, 1930, Kooshoak noted the first *Kokshouk* at the floe of Native Point. Only one was seen. On May 26 I myself saw and heard one at the floe. No birds were seen in the vicinity of the Post until June 10, on which date two, probably a mated pair, were noted circling very high in air above the frozen Inlet, calling loudly. On June 13 two pairs

were seen at the head of Coral Inlet, swimming in the shallow water which had gathered on the saline ice in one of the inlets. I believe these birds were mated. On June 15 a mated pair and a single bird were noted.

On June 16 the first courtship activities were observed. Most of the lakes were now well thawed, and the birds were abundant everywhere. The usual cries were the well-known *kra, ka, ka-kaoh, kra, ka kra-kaoh* repeated about twenty times in a hilarious, rough voice. High wails were sometimes given also, not at the end of a cry, as in the Pacific Loon, but by themselves; wild, melancholy, even tender cries, which suggested some of the familiar notes of the Common Loon, *Gavia immer immer* (Brünnich). Much of the courting seemed to take place in the air, the birds flying about far above the lakes, or the sea, calling constantly and indulging in queer swoopings on set wings, duet flights in which both birds gradually soared downward, sometimes for half a mile, without once beating their wings, and erratic zig-zag descents, in which the female apparently tried to escape from the male.

During the long, bright days of mid-June, when the sun at midnight was only a short way below the horizon, the cries of the Red-throated and Pacific Loons never ceased. So loud was the outcry of the loons, ducks, ptarmigan, and geese, that it was sometimes impossible to sleep. I am of the opinion, however, that most of the Red-throated Loons resident on Southampton are mated by the time they arrive, and their crying out is merely an expression of good health and exuberance.

On June 18 at Itiuaehuk I found a nest, which seemed to be ready for eggs, and saw about fifteen pairs of birds in the vicinity. At Itiuaehuk and Prairie Point I found nests, but no eggs, on June 20, 21, and 22. On June 24 I found a nest holding one egg, not far from the Post, and collected a male the stomach of which was empty, and the gonads much enlarged. On June 27 Noah found a nest containing two eggs near the mouth of the Koodloutok River. He told me that the first egg had been laid *two days* before the second. On June 28 I found a well-built high nest, containing one egg. Most nests were situated along the low, grassy shores of a small lake. As a rule, the eggs were laid in a damp, virtually bare depression in the moss, or humus, without lining. The nest found on June 28, however, had been built up to a height of fourteen inches above the surface of the water and was composed of grasses, bunches of roots, which had been pulled up from the bottom of the pond, and bits of weeds and stalks of plants. All in all it was the most elaborate nest of the Red-throated Loon I have ever seen. It was completely surrounded by water.

On June 29 I collected a set of two eggs, which were almost fresh, from the nest found on June 24. The eggs lay about two and one-half inches apart in the nest. The female was seen from a distance, as she incubated. Her position at first was fairly normal, her head held above the back about as in swimming. As I came closer, she stuck her neck down in front of her. When I was perhaps three hundred yards away, she slipped off quickly, dived into the water silently, and did not reappear until she was on the opposite side of the pond probably a hundred yards from the nest.

On July 2 Keetlapik gathered several sets of eggs, which were later eaten by the Eskimos. He also shot an exceedingly small, slender-billed male, which had been incubating. On July 5 Noah got a set of two eggs, which he let me blow. The contents were, as usual, eaten by the natives.

On July 6 Father Fafard collected an egg of a peculiar very deep chocolate color from a nest, which he had found during the preceding spring. When we compared the eggs taken during the two years from this same nest we were amazed at their similarity. It was perfectly obvious to me that they had been laid by the same bird, for their shape, ground-color,

and markings in general were amazingly similar. The Eskimos told me that eggs of the *Kokshouk* and *Kudloolik* (Pacific Loon) were always of two sizes, those which would produce females being rounder and smaller, those which would produce males, slenderer and more pointed.

On July 12 a small very trim female was caught in the salmon-trout-net, which was regularly set in one of the little coves near the Post. The stomach of this bird held the remains of fish.

On July 17 I found a nest containing one egg at Prairie Point. It is my belief that one egg had already hatched. Perhaps the egg remaining in the nest was infertile.

On July 24 I visited the nest, which I had found on June 24 not far from the Post, and found one egg at the point of hatching. This nest had held a fresh set of two on June 25. The period of incubation therefore was twenty-nine days. Bent states (1919, p. 75) that this period "is probably somewhat less than that of the Common Loon, as it is a smaller species." According to Knight (1908, p. 26) the period of incubation in the Common Loon is "very close to 29 days." The young bird found on July 24 was very feeble. It squealed weakly and shivered a good deal. Its crop contained bits of fish.

On August 4 I saw a pair in the salt-water near Bear Island, and examined three male specimens, which had been caught in the Eskimo trout-nets at the mouth of Kirehhofter River. All these birds had bare spaces in the plumage of the belly, indicating that they had incubated. None was in the post-nuptial moult.

Annual Routine: The *Kokshouk* arrives from the south in late May. It lingers about the ice-floe until the lakes have thawed. Most of the birds are probably mated by the time they reach Southampton, though courtship displays continue to be given until the middle of June. The birds return from year to year to the same lake and often lay their eggs in precisely the same place. Both sexes incubate. The period of incubation is about twenty-nine days. They procure most of their food in the salt-water. The young are fed and cared for by both parents, who probably regurgitate the food while the young are small; but later bring them entire fish. The young remain in their home-lake until they are quite able to fly. Thus they rarely make their way out to salt-water much before the middle of September. By the time they can fly they have lost their natal down. The parents and young continue to go about together for some time after the young have flown to the salt-water. Bent (1919, p. 77) states that the post-nuptial moult of the adults takes place "during the latter part of the summer. . ." I can say with some certainty that on Southampton Island no post-nuptial moult began during July, August, or early September of 1929 or 1930, while the birds continued to frequent the inland lakes. Just when this moult began among the birds, which had taken their young out to the salt-water, I cannot say.

I had abundant opportunity to compare the Red-throated and Pacific Loons daily. Both species fed exclusively in the salt-water. Both brought at least part of their food back to their young without swallowing it. Both frequently caught a small, pale species of sculpin, which abounded in the shallow water not far off shore. I noted that the Red-throated Loon in flying held its head lower than the Pacific Loon, giving the impression that it was sticking its bill up and pressing the rear part of its head down. The Red-throated Loon's body seemed heavier, also, in proportion to the length or size of the wings, so that it flew in a somewhat more labored fashion. The Red-throated Loon nearly always nested along the low shores of small, rather shallow lakes. All but two of the nests of the Pacific Loon, which I examined, were on the other hand placed on islands in large, relatively deep lakes. As to the call-notes of the two species: the duck-like quack or squawk was given only by the Red-

throated Loon; the deep growl and pup-like yelp was given only by the Pacific Loon. The *kud-loo-lee*, or whip-poor-will-like note was given only by the Pacific, the *Kut-ah-ka-kra-oh* only by the Red-throated Loon. But there were wails, barks, and groans, which were given by both species, and it was difficult to know which species was producing certain cries, since both birds were given to calling out at exactly the same time, and the call of one species usually incited the other to join in the clamor.

Although the attitude of the Red-throated Loon in flight is less graceful than that of the Pacific Loon, the former species can rise from the water much more easily, and if the wind is strong can leap out almost directly without much preliminary paddling. The Pacific Loon, like the Common Loon, sometimes has a good deal of trouble in rising from a very small pool.

The Red-throated Loon has few natural enemies on Southampton. Herring and Glaucous Gulls doubtless eat the eggs or young occasionally, though no nest which I observed was disturbed in any way by any bird or mammal. The young may occasionally be caught by jaegers, and the eggs and young, or even adults, eaten by the Arctic Fox; but the principal enemy is the Eskimo, who gathers the eggs throughout the summer season as long as he can find them, and whose trout-nets apparently catch a good many of the adults, while they are pursuing fish at the mouths of the rivers.

Fleshy Parts: The eye of the newly hatched young is dull brown. The bill and feet are dusky, darker than in the young Pacific Loon, and the feet are not greenish, as in that species. The eyes probably remain brown until the first mating plumage is developed.

The eyes of adult birds are rather bright brick-red, brighter than in the Pacific Loon. The bill is dull blue-gray, with a pale gray-white stripe along the culmen, and an area of dull purplish-gray at the base of the lower mandible. The feet are dark gray on the outside of the tarsi and toes, and dull, dead white on the inside.

Other Records: This is one of the few species which is mentioned by several of the earlier explorers. Parry (1828, p. 43) states that "a red-throated diver (*colymbus septentrionalis*) [was] obtained by the gentlemen of the Hecla" on August 17, 1821, near Cape Welsford. Lyon (1825, p. 95) speaks of finding it north of Harding Point along the shores of Sir Thomas Roe's Welcome. Preble (1902, p. 77) found it abundant along the west coast of Hudson Bay south of Cape Eskimo from August 4 to 13. He collected a male and a young in dusky, downy plumage on August 4. Eifrig (1905, p. 234), treating of Low's experiences with the species in the Southampton region says: "three skins from Cape Fullerton, a male June 17, and two females July 16, 1904. . . . The full set is . . . two eggs. Size 2.85 x 1.70. This species is not quite as common as the preceding [Pacific Loon], still it is not uncommon in the same places. . . . It can fly directly from the water (A. P. L.) which the preceding species cannot do so easily. Stomach contents: fish bones and stones."

Low (1906, p. 314) says: "Common along the shores and islands of Hudson Bay and Hudson Strait, to the northward of James Bay. . . . Breeds on islands or shores of ponds, not far from the coast. Feeds in the sea and fresh water. Skins and eggs from Fullerton and Southampton."

Mathiassen (1931, p. 28) mentions the "loon (*Colymbus septentrionalis*)" among the species observed during the last week in August, 1922, at Kûk, Duke of York Bay. Mr. Ford told me he saw it often on Coats Island. Soper (1928, p. 78) and others found it well distributed about Baffin Island. Mr. Swaffield took several specimens at Mansel Island during 1929-1930 (Sutton, 1932a, p. 41). We noted it along the west coast of Hudson Bay during the late

summer and fall of 1930 (1931c, p. 156). Captain Comer took sets of eggs on Southampton Island on July 2, and July 5, 1904.

Order COLYMBIFORMES.

Family COLYMBIDÆ.

Genus COLYMBUS Linnæus.

Colymbus grisegena holboelli (Reinhardt). HOLBOELL'S GREBE.

Joseph Sabine, in the Appendix to Sir John Franklin's *Narrative of a Journey to the Polar Sea* (1823, p. 692) mentions having received specimens of *Podiceps rubricollis* "from Hudson Bay." Just where these specimens came from, no one seems to know. Preble (1902, p. 75) states that since "the species is recorded from other northern points and breeds in Manitoba it probably occurs throughout the Hudson Bay region." I heard no report that any species of grebe had ever been seen on Southampton by Mr. Ford or any of the Eskimos. Bent (1919, p. 18) includes under the *breeding range* of the species "northern North America and northeastern Asia. East to northern Ungava and Hudson Strait . . ."

Colymbus auritus Linnæus. HORNED GREBE.

Dr. Robert Bell found this species breeding at Fort Churchill (1883, p. 49) and collected it at Fort Severn and York Factory. A specimen collected by Rae at "Repulse Bay" is recorded in the British Museum Catalogue of Birds. Many of the specimens collected by Rae during the earlier part of his expedition may have been accredited to Repulse Bay erroneously, and it is impossible to determine which of these were actually taken along the mainland west or northwest of Southampton Island. It seems likely in the present case that the bird was taken considerably south of Repulse Bay. None of the Aivilik Eskimos who knew the Repulse Bay country had ever seen or heard of such a bird, and none of the Eskimos had ever seen a grebe of any sort on Southampton.

Order PROCELLARIIFORMES.

Family PROCELLARIIDÆ.

Genus FULMARUS Stephens.

3. *Fulmarus glacialis glacialis* (Linnæus). ATLANTIC FULMAR.

Eskimo Name: The Aivilikmiut called this bird the *Kakoodlook* (*Kakkordluk*³ according to Hantzsch, 1928, p. 172, and *Oohudluk* according to Soper, 1928, p. 85). I did not find what this name meant. One of the young men of the Aivilik tribe had been nicknamed *Kakoodlook* for some reason, perhaps because of his habit of squinting his eyes. The Eskimos were familiar with the strange beak and nostrils of the bird and with its odd, disagreeable odor, but I did not learn of any connection between the name and these peculiarities. The word *Kingalik* means 'he has a nose'; and the word *Mamaitook* means 'it smells bad'; yet neither of these words, obviously, approximates *Kakoodlook*.

Status: An irregular wanderer throughout the northern part of Hudson Bay, occurring chiefly to the eastward of Hudson Strait especially about Port Burwell and along the Labrador. Usually seen in the present region in summer and early fall, and not often in the spring.

Records: On the evening of April 26, 1930, at about seven-thirty o'clock, and precisely at sundown, Tommy Bruce and I saw a solitary fulmar flying across a relatively narrow

³Hantzsch says that this word *Kakkordluk* means "poor (or dubious) white, on account of the soiled colouring." I think this must be an error, or at least that it does not apply to the Southampton region, for the word for white used on Southampton approximated *kadloutuk*, thus being basically a different word from that for the fulmar.

stretch of water, not far from us. The bird was headed southeast. We were at the time at the open floe southeast of Bear Island. The weather was perfect, though it was bitterly cold; the water was smooth as a mirror, and the brilliant orange sky was so reflected from water and ice that we seemed to be looking through colored lenses. We saw the bird plainly for several seconds, had a clear look at it through the glass, and entertained no doubt as to its identity. It was an adult, with gray back and creamy breast. Its coloration, manner of flight (three or four wing strokes, then a short soar), and its position but a short distance above the water, all made the creature unmistakable as a fulmar.

Tommy Bruce appeared to be as happy as I, on seeing this bird; but his delight centered not so much in the bird, as in the fact that I had correctly identified it in so short a time. The Eskimos are obsessed with the belief that no one aside from themselves can know anything about the birds and mammals of the world which they consider distinctly their own. Tommy Bruce and Amaulik proceeded to tell me that the *Kakoodlook* was occasionally seen at the floe at almost any season of the year, though they could not recall having seen it in the dead of winter. We had quite a discussion about the queer bill of the bird, its odor, and its fattiness. My friends tried to tell me some sort of a yarn about an Eskimo, who had worn snow-glasses, and who was later transformed into a fulmar; but I did not catch the point of the story.

A fulmar had been seen in July of a former year near Bear Island by Amaulik. Mr. Ford told me he had noted one or two in Fisher Strait during his residence at Southampton and Coats Islands. Many of the natives, to my great astonishment, spoke of the abundance of these birds along the Atlantic Coast, especially at Pond's Inlet.

Other Records: James Clark Ross speaks of the fulmar as "peculiarly numerous in Hudson Bay, Davis Strait, and Baffin Bay" (1835, Appendix, p. xxxviii); neither Eifrig (1905, p. 236) nor Low (1906, p. 316) even mention the species as characteristic of Hudson Bay at any season; and Soper (1928, pp. 85 and 86) though mentioning Hantzsch's record of a "single individual [seen] over the ice-covered shore of Fox Channel" (October 2, 1910), evidently regards the species as rare along the southern and western shores of Baffin Island.

Order ANSERIFORMES.

Family ANATIDÆ.

SUBFAMILY CYGNINÆ

Genus CYGNUS Bechstein.

Cygnus cygnus (Linnæus). WHOOPER SWAN.

Mathiassen (1931, p. 28) tells us that "according to the Eskimos . . . a large number of swans (*Cygnus musicus*) breed" in the southwestern part of Southampton. The identification of these swans as *musicus* (*musicus* of Bechstein being a synonym of *cygnus* Linnæus) is erroneous. Mathiassen apparently supposed that the range of the present form extended thus far westward of Iceland and northern Europe. The swans the Eskimos spoke of were undoubtedly Whistling Swans, *Cygnus columbianus* (Ord).

4. *Cygnus columbianus* (Ord). WHISTLING SWAN.

(Plate XII, fig. 2)

Eskimo Name: Both Aivilikmiut and Okomiut called this great bird the *Kugjuk* or *Kugzhuk*. Mr. Brandt tells me that the Alaskan Eskimos called it the *Ko-ute*.

Status: The Whistling Swan is one of the characteristic summer birds of Southampton. It is especially common in the region of Cape Low, and irregularly so along the shores of the

Bay of God's Mercy. At Cape Kendall, where the Blue and Lesser Snow Geese were found nesting in large numbers in the summer of 1930, it was not seen by the Eskimos who visited the region, and it is believed that where the geese colonize, the swans for some reason or other find it unsatisfactory to remain. It was formerly common in the vicinity of the Post at Coral Inlet, but the nesting pairs have gradually been killed and the eggs taken, until it has completely disappeared there. At Prairie Point, however, a few are still to be found. The natives told me that it nests all over the Island, at Native Point, East Bay, Duke of York Bay, and elsewhere, though the chief breeding-ground is at Cape Low. It arrives among the earliest birds of the spring, and lingers until the cold weather threatens to freeze shut the bays and inlets.

Fall Records: On August 27, 1929, one was seen flying at a considerable distance inland, at Four Rivers. On August 29 at Hut Point, while walking inland across the marshy and grassy tundra, I encountered a pair and their single half-grown offspring which was too young to fly. As I approached, the parents flew up with a loud, sonorous *ga-loop, ga-loop, wha-loop*. The young one rose from his resting position and made off at a great rate, taking enormously long strides. Had I pursued this bird walking I should never have caught it; I had to run as fast as I could. By the time I had overtaken it, I was so badly out of breath and tired that I was glad to sit down for a rest even in the water. The parents flew about in wide circles, sometimes dipping low, but usually staying at a considerable distance from me. The young bird was silent, until I actually touched it with my hand; then it let out some low *cronking* notes and struck at my hands and face with its bill. I had some difficulty in holding it, for it kicked violently. I carried it back alive, for I wanted to take some photographs. The parent birds escorted me all the way, calling constantly from high in air. All their actions were most dignified. On the following day I crawled through the grass and got fairly close to them as they fed at the edge of a large lake.

On August 31 at a lake near Hut Point, which I called Gull Lake, I found at the western end twenty-one large mounds of grass and moss, most or all of which were, I think, the nests of swans. All about the grass between these nests were feathers and droppings of swans, and six pairs of the great birds were seen in the vicinity. The nests were from one to three feet high and from five to seven and a half feet in diameter (outside measurements), and were situated from one hundred yards to a quarter of a mile apart from each other. They were composed of material which obviously had been gathered close by. I cannot say whether these nests had all been in use during the preceding season, but many of them had the appearance of having been recently relined. It is the belief of the Eskimos that swans do not nest in colonies as a rule; and I saw no evidence elsewhere on the Island that they do so; but it seems hardly likely that but one pair of swans had built all the nests seen at this place. It may be that the six pairs noted in the vicinity had used part of the nests and that the other nests were older structures which had been in use in past seasons. When I spoke to Amaulik about the matter, he suggested that perhaps the male birds built nests of their own upon which they roost at night while their mates are incubating not far away.

On September 1 several swans were noted along the shore between Hut Point and the mouth of the Ranger River. Just before leaving Hut Point I found what I think must have been a swan's nest perhaps two hundred yards in from the mark of high-tide. On September 2 and 3 at Cape Low, great numbers of swans were seen all through the region. Not only were pairs noted as they flew over, fed along the lakes, or rested out in the wide prairies, but flocks, some of them composed of from ten to thirty adult birds, were seen several times. As a rule such large birds as these are decidedly wary. These swans, however, sometimes

allowed me to approach them rather closely; and, when I could slip up on them behind one of the long gravel- or sand-ridges, I had wonderful glimpses of them, as they fed, preened themselves, or stood on one foot, the silken, almost yellow, whiteness of their plumage gleaming against the drab monotony of their late summer surroundings. Many of the birds fed in the narrow lakes between the ridges which paralleled the coast-line, and here it was often possible to creep up on the birds without much difficulty. On September 2 I shot two adult females, and on September 3 a male and female. All these specimens were in good condition, though they were not very fat. The plumage of the crown was of a handsome golden brown color, rather uniform throughout the series.

On September 3 I saw a mother bird and three almost full-grown, but very gray, young in a lake not far inland from the Cape. I did not locate many nests and understood from the natives that most pairs nest farther inland and come out to the salt-water at the end of the summer. Once, at Cape Low, I saw a pair of swans wading about in the shallow water in the middle of a large lake. The attitudes assumed by the feeding birds did not strike me as particularly graceful. The necks were sometimes stiffly held, and the attitudes of the great feet were anything but gainly; but the movements of the birds were always dignified and majestic and gave an impression of considerable intelligence and power.

From September 4 to 8 several were seen in the vicinity of Four Rivers. On September 5 at a place not far inland from the salt-water and about four miles from camp, I came upon a family-group, two parent birds and four nearly full-grown young not yet able to fly. The adults flew back and forth in great excitement, while the young gathered in a compact group in the middle of the lake. Some of the notes of the parents were distinct, ducklike *quacks*. Twice one of the birds, which later proved to be the male, swept downward over me, as if bent upon striking me. Once he rushed downward, checked himself in mid-air just over the young, and dropped with a spectacular roar of wings and great splash in their very midst. The female was more cautious. Finally, after I had watched the birds for about half an hour, staying all this time on one side of the lake, the young gradually made their way to the opposite side of the lake and stealthily crawled out into the grass. Thence they made their way rapidly over land to an adjoining lake, where I left them with their mother.

On September 6 Tommy Bruce shot two adults with his rifle. He gave them to some of the needy natives, so I did not have opportunity to examine them.

We did not see any swans in the vicinity of the Post or at Prairie Point during the fall of 1929, nor did we see a single individual on the entire trip to Seahorse Point. We did, however, see some feathers and droppings not far from Leyson Point, where Kooshooak told me he had once known the birds to nest.

Spring Records: On May 25, 1930, two birds which were thought to be a mated pair, were seen at the Native Point floe by Kooshooak. These birds appeared to spend all their time swimming about in the water at a considerable distance from the edge of the ice. On June 1 natives reported to me that swans were to be seen all along the edge of the floe in the vicinity of Native Point and Bear Island.

On June 5 I saw a pair flying northwestward over Seal Point. They were calling softly. They flew not far above the ground, and appeared to be looking for some snowless area where they could stop for food and rest. They seemed to be high in air by the time they had reached the mouth of the Koodlootok River some distance to the westward. On June 6 a pair were seen near the mouth of the Koodlootok, feeding along one of the bare-topped gravel-ridges. On June 7 two pairs were seen flying westward above the Post.

On June 8 one flew not far from me at the head of South Bay. It was making for the plains west of Itiujuaik. As it flew by it called *hit, hit* in a feeble voice, which called to mind a much smaller bird. On June 10 a pair were seen flying westward over Seal Point. On June 13 in the region just west of Itiujuaik, Jack Ford and Santiana saw many swans, both in pairs and in flocks, about the lakes which were thawing rapidly and in the snowless patches on the prairies. He also saw some mating antics, peculiar bowings and raisings of wings, accompanied by groans and honks given by both birds. He collected two specimens for me, a male and a female, the latter having an egg in her ovaries about the size of a baseball. I could not get the accurate weight of these specimens since most of the viscera had been cut away.

On June 3 at Itiuaichuk, Jack Ford and I saw three birds, and found a nest containing three fresh eggs, which we collected. The nest was built on a low island in a very large, shallow lake; it was about thirteen inches high. The female was on the nest when we first came up, and the male was on guard. Both birds were very wary.

On June 21 I found a very interesting nest about four miles inland at Prairie Point. The huge structure was built in the middle of the grassy tundra, at a considerable distance from the nearest lake, and it stuck out like a landmark from a great distance, particularly while the female was incubating. It was about six and one-half feet in diameter at its base, three feet in diameter at its rim, and twenty-seven inches in height. It was built altogether of moss and grass, which had been pulled up nearby, and which had been so effectively uprooted that the ground for fifteen feet about the nest was completely devoid of any vegetation. The eggs, which lay in a cup about eight inches deep, were not very close together, as if each had a separate incubation chamber among the feathers of the mother's belly. A single large boulder stood not far to one side of the nest. (See Pl. XII, fig. 2).

When I first saw this nest, both birds were at home. As I approached, the female rose to her full height and walked majestically away. The male had already started off. Finally both flew up, circled several times while calling softly, then settled about half a mile away in the nearest lake.

I could not see that the lining of this nest was made of any softer material than the rest of the structure, save that it was considerably mixed with down.

On June 27 Noah brought in two eggs from the Koodlootok River region. I did not attempt to save these, since I learned that the nest had originally held three eggs.

On July 9 Tommy Bruce brought two sets of three eggs to me from the Cape Low region. He had collected these about the first of June. He had come across about twenty nests in all, though he had made no special attempt to locate them. He did not find any in the Cape Kendall region near the colony of nesting Blue and Lesser Snow Geese. When I asked Tommy further about the date upon which he collected these eggs I found that the season at Cape Low, generally speaking, was much earlier than it had been in the region of Coral Inlet. The swan-eggs he collected there on about June 1, for instance, had been laid several days before; whereas in the region of the Post we had not even seen swans before the fifth of June.

On July 10 Keetlapik brought me a male specimen, which he had shot at the mouth of the Koodlootok River. The plumage was obviously that of an immature bird, since there was much gray mixed with the white of the head and neck. The feathers were moulting, especially the rectrices, which were in all stages of development.

On July 30 Noah saw several adults with their young some miles inland from the mouth of the Koodlootok. These were in the midst of the post-nuptial moult, and were unable to

fly. These are the only exact data I gathered as to this interesting phase of the life-history of this swan. I did not see a downy young bird.

Annual Routine: It is my belief that when the swans arrive at Southampton Island they are as a rule mated. It may be in fact that the birds frequently mate for life. A certain amount of courtship nevertheless takes place. Sometimes they return before the snow has melted from their nesting territory; at such times they linger about the open water at the edge of the floe. What they feed upon at this time I cannot say.

The nest is built shortly after the birds arrive. Old nests are sometimes relined or rebuilt. Both sexes take part in nest-building; incubation, however, is carried on only by the female, while the male stands on guard not far away. At Southampton the set of eggs is usually three. Bent (1925, p. 284) states: "The usual number of eggs seems to be 4 or 5, though as few as 2 and as many as 7 have been reported." I secured no data upon the length of the period of incubation, and do not know at what time the young hatch. The adults undertake their annual post-nuptial moult about the end of July and apparently make their way inland to the less frequented lakes with their young, where they spend the flightless period. After this moult, both young and old birds gradually move out to the shores of the bays and inlets, where they feed in the shallow coastal lakes and on the tundra. I do not know whether they linger in the salt-water later than the time of the freezing of the inland lakes, or not; but I think they do not. They leave the Island probably about the end of September.

Fleshy Parts: The bills of all adults examined were practically black. There was considerable variation in the size and shape of the yellow spot in front of the eyes, and in the intensity of the reddish flesh-color along the edges of the mandibles in the region of the strainers. The feet were not precisely black; they were a dark gray. The eyes were dark, the irides of a deep, rich brown. The eyelids were dull blackish gray.

The bill of the half-grown young bird taken on August 31 was pinkish flesh-color, brightest along the sides and in front of the eyes; the nail was grayish, with a vague purplish cast. There was no hint of any yellow spot in front of the eyes. The eyelids were purplish gray. The eyes were dull brown with a bluish cast; and the feet were pale purplish flesh-color of a subdued shade.

Other Records: If the name *Carey's Swan's Nest*, which appears on so many of the earliest maps of Southampton and Coats Islands, was indeed given because of the swans seen thereabouts, as some authors would have us believe (see Part I, pp. 12, 14), then the swan was one of the first of the birds of Southampton to be mentioned in literature. According to Dr. Robert Bell (1885, p. 30 DD), the species nests on Nottingham Island, to the east of Southampton. Preble (1902, p. 91) says: "Whistling Swans visit the western shores of Hudson Bay in great numbers in the spring and fall, and their assembled thousands are said to present a beautiful and imposing spectacle during their semi-annual visits."

Eifrig (1905, p. 238) says: "Two were taken on Southampton Island, where it was common, as also in the flat land north of Repulse Bay. They breed in low lands with lakes, where their nests, constructed of seaweed, grass and moss, are very conspicuous. They are very bulky affairs, about three feet in diameter at the base tapering to 18 inches at the top, and 18 inches high. A set of 2 eggs was taken on Southampton, July 4, 1904. They are ivory-color, unspotted, one end as large as the other; sizes: 4 x 2.55; 3.50 x 2.45. It may be interesting to ornithologists, who make their own bird skins, to hear that the fat of all these fatty skins was removed by the Eskimos, who bite it off. And they do it cleanly and thoroughly. Tastes differ!"

Low (1906, p. 317) says: "Common on Southampton Island, where it breeds in a large nest of moss and grass in the swampy ground about the ponds. Skins and eggs from Southampton."

Bent (1925, p. 292) includes Nottingham and Southampton Islands under the *breeding range*. Mathiassen recorded it in the fall of 1922 in the region of Duke of York Bay, probably near Hansine Lake. When the Hudson's Bay Company Post was established at Coral Inlet, Mr. Ford and Mr. Copland saw many swans in the lakes nearby, and Mr. Ford remembers having seen many on Coats Islands where they bred regularly.

Soper (1928, p. 95) says: "At cape Dorset on June 13 and 14, 1926, two flocks of what were taken to be swans, passed northward flying very low. A heavy mist made identification uncertain." Evidently he did not find the species at all common on Baffin Island.

Mr. Swaffield took a specimen in midsummer on Mansel Island (Sutton, 1932a, p. 41). We did not record it in the Chesterfield region during the late summer and fall of 1930. Captain Comer took a set of three eggs on Southampton Island, probably at Cape Low, on July 5, 1904.

SUBFAMILY ANSERINÆ.

Genus BRANTA Scopoli.

5. *Branta canadensis canadensis* (Linnaeus). COMMON CANADA GOOSE.

Eskimo Name: The Aivilikmiut called this large "Honker," as well as its smaller relatives, the Lesser Canada Goose and Hutchins's⁴ Goose, the *Nekilik* or *Nukilik*, the word being an imitation probably not of the cry of a single bird but of the sound of the flock as it passes over. In recognition of the large size of the occasional Honkers which are seen, they sometimes add the rather over-used suffix *juak* to this word. The resultant *Nukilajuak* is hardly intended to designate a separate species, however; it is more nearly the equivalent of our expression 'a very large goose.'

Status: The Honker is a very rare summer resident or migrant, which has been definitely taken only a few times on Southampton Island. Perhaps its occurrence here is largely accidental, the result of storms which blow the strongly attached, mated pairs, from the southwestern part of Hudson Bay, or from Baffin Island. Bent (1925, p. 222) states that the breeding range of *canadensis* extends "north to the northern limit of trees in Mackenzie (Providence and Fort Anderson) and northern Quebec (Whale River)." Taverner (1931, p. 32) says: "*Canadensis* breeds across the continent, in the east as far north as the southern Baffin Island coast, in the west an undetermined distance north of the prairies and southern British Columbia. As determined by Jack Miner's banding records and available specimens it is the common breeding goose of James and Hudson bays for most of the east coast and the west side, at least as far as Churchill, probably stopping somewhere south of Cape Eskimo, where it appears to be replaced by *leucopareia*."

The Honker is not, according to the meagre data I have been able to gather concerning it, a bird of the coastal lakes on Southampton, but rather a form of the interior, nesting along the shores of the larger streams some distance inland, and occasionally along the

⁴It seems to the author regrettable that the Committee of the American Ornithologists' Union, in publishing their new Check-List, have not adopted Mr. Taverner's suggestion (1931, p. 37) that this little goose be called *Richardson's Goose*. The name *Hutchins's Goose* has so long been applied to the larger form, which is now to be known as the Lesser Canada Goose, that much confusion is certain to result. Had I been naming the small form under discussion, I should have called it the *Barren Grounds Goose*, thereby incorporating some suggestion as to its breeding range, and at the same time avoiding such complications as sometimes follow the use of specific names given in honor of a human being.

shores of the larger inland lakes. In this respect it is like its smaller relative *B. c. leucopareia*, which pushes inland beyond the outer lakes to find a suitable nesting ground, but unlike the still smaller *B. c. hutchinsi*, which nests almost exclusively on islands in the coastal lakes.

Records: During the midsummer of 1928 (the year before I reached the Island), the native Keetlapik discovered a pair of Honkers with their nest several miles inland along the shore of the Koodloutok River, perhaps twenty-five miles from the Post. So surprised were he and his companions at the size of these birds, and more especially at the size of their eggs, that he brought them all in to the Post, where Mr. Ford had an opportunity to examine them carefully. I made considerable inquiry about these birds and their eggs. There can be no doubt they were very big geese, for Amaulik Audlanat told me that when he had first seen the eggs he thought them swan's eggs. The nest was situated among some willow-bushes not far back from the edge of the swollen stream, and, instead of being built into a depression, was piled up more or less like a swan's nest, so that it could be seen from some distance. Nests of *leucopareia* are built in the same way. The five fresh (or at least *edible*; *fresh* and *edible* are scarcely synonymous) eggs were lying in a thick bed of down. This pair and the eggs were taken "sometime in the middle of June." The Eskimos went back the following year to find more of the birds, but did not see any.

During early June of 1930, Keetlapik again found a pair of very large *Nekilik*, in the vicinity of the salmon pond in which the Koodloutok River rises. He was able to get only one of these birds, and unfortunately even this specimen was not preserved, so the only definite measurement I could secure from its remains was that of the wing, the distal joint of which was being used as a broom. This wing measured about 19 inches (480 mm.) even in its somewhat frayed condition, making it obviously too large for the largest *leucopareia*.

Other Records: Many of the earlier explorers make reference in their journals to "geese"; but the birds referred to are for the most part probably the smaller varieties, and there is no indication among any of the published material at hand that the large *canadensis* has heretofore been taken or noted by anyone in the region of Southampton, Chesterfield, or Repulse Bay. According to Taverner (1931, p. 32), however, Soper found it on Baffin Island as a fairly common summer resident.

6. *Branta canadensis leucopareia* (Brandt). LESSER CANADA GOOSE.

Eskimo Name: The Aivilikmiut name for all the geese of the *Branta*-group is a word approximating or built upon *Nekilik* or *Nukiluk*. I never heard the present form called by any other name, though all the Eskimos seemed to realize that it was different from the smallest sort of *Nukiluk*.

Status: This close relative of the big Honker is a rather rare summer resident, found principally in the interior along the shores of the larger streams and lakes. It is not a bird of the coastal lakes, as is *B. c. hutchinsi*. It arrives in the spring a little earlier than the latter bird, from which it is quite impossible to distinguish it in the field; and both these species arrive earlier than the Brant, which is one of the latest species to reach its breeding-grounds. The Lesser Canada Goose appears to be somewhat more common in the South Bay region, especially along the rivers which drain into the western side of the Bay, than it is in the rugged eastern or flat western parts of the Island. The few recorded individuals of the larger Honker were found in this same part of the Island, and this immediately suggests the possibility that *canadensis* and *leucopareia* are not even subspecifically distinct. As noted in our discussion of the status of the larger form, however, the presence of *canadensis* is prob-

ably largely accidental, so that its occasional occurrence has little to do with the status of the present race.

After studying the matter carefully, I have come to the conclusion that the three forms of *Nekilik* found on Southampton Island belong to *two separate species*, one a *larger form* which nests along the inland streams and lakes, the other a smaller form, which nests only among the coastal lakes. Two varieties or subspecies of this *larger form* have been noted: the big Honker, which only occasionally strays thus far north or west of its usual breeding range; and the smaller *leucopareia*, which has retained the nesting habits of its race, though it perhaps has modified them to some extent in the absence of tree-growth. The smaller species, which Taverner (1931, p. 37) has accorded full specific rank and called Richardson's Goose in an attempt to avoid the rather ambiguous term *Hutchins's Goose*, is not, as I see it, a Canada Goose at all, but an Arctic or Barren Grounds Goose, a distinct bird, differing in its feeding and nesting habits. It is indeed remarkable that these *two separate species* should thus occur together in a comparatively restricted region. Obviously they are related; yet quite as obviously they are distinct, and the supposition that they have thus occurred together for centuries, yet retained their own individuality, strongly suggests that they may not be as closely related as their external appearance may lead us to believe.

The Lesser Canada Goose and smaller Hutchins's Goose do not arrive simultaneously in the spring, as has been noted above. The larger, earlier bird makes its way inland at once, so that it is practically never seen in company with the flocks of the smaller species; and it is almost never seen feeding on the salt-water flats. The Eskimos believe it possible to distinguish the two species by their call-notes; but I am not convinced that such recognition is possible. The nesting habits of the two forms are, however, distinctly different. The present form builds a mound-like nest, somewhat like that of a Whistling Swan, but much smaller, along the edge of a river or large lake, usually many miles inland, so far inland, in fact, that the parent birds never come out to the coast to feed, but eat the weeds which they find in the lakes, and the grass which grows on the tundra. The nest is composed of grass and down, like that of the larger *canadensis*, and often has a well-defined foundation of heavy grasses, twigs, and weed-stalks.

The nest of the Hutchins's Goose, on the other hand, is always built on a small island or an almost insulated peninsula, in one of the coastal lakes. It is well scooped out, and lined warmly with down, but it has no foundational material heavier than dry grass or chunks of moss. I never saw the nest of a Hutchins's Goose anywhere along the bank of a stream or of a large lake. I examined at least one hundred and fifty nests, and all of them, but one, were situated on small islands; one nest was placed on a slender point, which had probably been an island at the time the eggs were laid.

In a letter to the Smithsonian Institution quoted by Bent (1925, p. 224), MacFarlane writes, concerning the nest of what he calls the "Hutchins" Goose: "I have no doubt about Hutchins goose being a good species; its mode of nesting alone would go far to prove it distinct from the Canada goose, which it greatly resembles. The former, so far as I have been able to ascertain, *invariably* nests on the small islands which occur on the small lakes of the islands situated on the shores of the Arctic Sea, while the latter generally builds in the neighborhood of the lakes and rivers of the wooded country. The former also scoops a hole in the sand or turf, lining its sides with down, while the nest of the latter is composed of a large quantity of feathers and down placed on or supported by some dry twigs or willow branches."

The 'Hutchins Goose' referred to here is assuredly our Hutchins's Goose, and the 'Canada

goose' is *canadensis*, or, perhaps, *leucopareia* at the northern frontier of its nesting range. Nuttall (1834) and other writers also call attention to the marked difference in the habits of the Canada Goose and this smaller form.

The habits of a given species are known to vary considerably in different parts of its range, to be sure, as environment may dictate; but in such fundamentals as nest structure we may expect a species to be fairly constant, no matter where it is found. Thus the Mourning Dove, even though it might conceivably invade a treeless country where it would be forced to nest entirely on the ground, would hardly be expected to give up its habit of laying a few straws about in semblance of a nest. So, it seems to me, we might expect the Hutchins's Goose, were it truly a close relative of the Canada Goose, to build a nest basically like that of the larger bird. The island-nesting habit might arise as a result of desire to evade natural enemies in the absence of cover, such as wooded country would furnish; but the scooping out of a nest, and the omission of foundational materials—this appears to me to be a basic difference, which clearly shows that the ancestors of the Hutchins's Goose have inhabited for a long time a sort of breeding-ground distinctly different from that occupied by *canadensis*. That the color-pattern of the two species is similar shows either that such a color-pattern meets successfully the needs of such an intelligent bird as the goose in widely different types of environment, or that the evolution of the two forms has been convergent.

Unfortunately, I did not procure any downy young of the present form for comparison with young of the Hutchins's Goose. The eggs of the Lesser Canada Goose were consistently larger than those of the smaller bird, however, though the number of eggs in the set was the same in both species. The present form nests earlier than the smaller species, as a rule.

As Taverner (1931, p. 34) says, the Lesser Canada Goose is "between *canadensis* and *hutchinsi* in size." In studying my series from Southampton I find that *leucopareia* is consistently and noticeably larger than *hutchinsi*, that the white throat-patch in *leucopareia* is more likely to be crossed by a complete or nearly complete median black streak in both sexes, and that the barring of the underparts in general is inclined to be broad and cloudy, rather than neat and definite, as it is in *hutchinsi*.

Measurements⁵ in millimeters of *Branta c. leucopareia* from Southampton Island.

MALES					
G. M. S. No.	C. M. No.	WING	CULMEN	TARSUS	WEIGHT
3670	110,226	415	45	78	7 lb. 1 oz.
3671	110,227	393	41	77	7 lb. 1 oz.
FEMALES					
3513	110,081	412	46	74	7 lb. 3 oz.
3621	110,179	394	48	80	.....
Average of all specimens.		403.5	45	77.25	

Taverner (*Ibid.*, p. 34) gives us the following average measurements of a series of fourteen specimens: Wing, 402.85; Culmen, 39.14; and Tarsus, 78.08. Our Southampton birds vary a good deal in size, it will be noted; but the bills apparently are a little longer on the whole, than in the birds Taverner has measured.

⁵Measurements presented in this paper have been taken as follows: *Wing*: the shortest distance from the bend of the wing (proximal end of the manus) to the tip of the longest primary, therefore the *chord* of the folded wing. *Culmen*: the exposed portion of the culmen. *Tarsus*: in all cases aside from the geese, from the groove marking the joint between the tibial and tarsal regions to the distal margin of the last tarsal scute; in the geese, where the scales are small and difficult to locate consistently, from the groove between the tibial and tarsal regions to the point where the tarsus and middle toe appear to meet. *Tail*: the distance from the base of the two middle rectrices to the tip of the longest rectrix. In the geese, the tail measurements are omitted because they appear to have no particular bearing upon the problem.

Fall Records: Many flocks of what we called 'Canada' geese were seen during the fall of 1929, from August 28 almost to the end of September, and I learned from the natives that some *Nekilik* were seen along the southern coast even later. But most of these were, I think, Hutchins's Geese. The only definite record of the present form which I secured was of three birds, all taken from the same flock, in the region of Munnimunek Point by one of the Okomiut Eskimos. None of these specimens was preserved, but I had opportunity to compare the bills and wings with those of seven birds taken from a different flock, all of which were of the smaller race.

The two forms migrate southward in about the same way and at the same time, but apparently keep in separate flocks all the time, the larger birds feeding in the grass country between the lakes, while the smaller birds feed and rest on the outer mud-flats, or along the sandy beaches, like the Brant. That the migrating flocks of the two species keep thus distinct may be partly due to the tendency among geese to migrate in family-groups; but I think it is largely due to difference in the feeding habits of the two species.

Spring Records: A single individual was seen in company with a Lesser Snow Goose on Bear Island, on May 18, 1930. This bird was shot by the Eskimos and I could tell from the few remains which I had opportunity to examine that it was of the present form. The earliest Hutchins's Geese did not arrive until a week later, and by this time (May 25) Keetlapik had observed a mated pair and a solitary individual of the Lesser Canada Goose, which had established themselves along the Koodloutok River about ten miles inland from its mouth. On June 6, Keetlapik found the nest of this pair situated about three rods back from the edge of the stream. The two eggs were eaten by the Eskimos before I had a chance to measure them. The female parent was brought in to me as a specimen, however, and I recognized it instantly as one of the larger birds. It was very fat and the skin exceedingly thin. The full set of eggs obviously had not been laid, since there were several well-developed ova in the ovaries.

On June 18 Noah brought in from Koodloutok River three geese, two of which were a mated pair⁶ of the present form. The nest of this pair had contained five eggs which were considerably incubated. The nest had been built between the shore of the river and the edge of a big salmon pond, and it was so high as to be visible from a considerable distance. On June 27 Noah brought in two more large birds from the Koodloutok region, and, though these were somewhat decomposed, I managed to save them. By this time according to the Eskimos many of the young were hatching. Noah told me he saw a brood of young on July 5. Young of the smaller *hutchinsi* were not seen until some time later (July 14).

On July 30 some of the Eskimos made a long trip inland along the Kirchhoffer River and found two families of large geese at one of the inland lakes, in the midst of the post-nuptial moult.

Annual Routine: The Lesser Canada Goose arrives from the south a little earlier than the much commoner Hutchins's Goose. It makes its way inland almost at once, since it can live on the lichens and grass, which it finds in the snowless places. By the time the flocks of Hutchins's Geese arrive, it is already fairly well established on its nesting-grounds, and its eggs are sometimes laid, as are those of the Whistling Swan, before the snow has disappeared from the meadows.

It feeds inland along the shores and bottoms of the shallow lakes and streams, and does

⁶Since I was just leaving on a komatik-trip at the time these specimens were brought in, I was able to save only one of the *leucopareia*. The specimens I did save were skinned out as I rode on the komatik, crossing the frozen harbor.

not make daily trips out to the tidal flats as does the Hutchins's Goose. The nest is built along a lake-shore or on the bank of a stream. Only the female incubates; the male stands on guard. The eggs usually number five or six. In midsummer the adults lose all their flight-feathers during the post-nuptial moult, and regain their primaries and secondaries while the young are learning to fly. All the birds leave the Island together in family-flocks in mid-fall.

The enemies of this form are the same as those of the other geese. It is to be noted, however, that the habit of nesting inland has eliminated many of the enemies which beset the more coastal species. The Lesser Canada Goose, for instance, has hardly to guard against jaegers at all, since these pirates nest and do most of their hunting along the outer shores. Even the foxes and Herring Gulls live principally along the belt of coastal lakes, where they find an abundance of food. This scarcity of natural enemies inland doubtless accounts in large measure for the habit of nidification on the shores of lakes rather than on islands.

I was much surprised to find that the Eskimos did not pursue half-grown and flightless geese. They got what birds they could with shot-gun or rifle, and sometimes killed so many that they could not consume them at once; but I never saw them attempt to chase down flightless families of birds either for themselves or for their dogs.

Fleshy Parts: There was no difference, so far as I could see, as regards the color of the feet, bill, and eyes, between adult Lesser Canada and Hutchins's Geese.

Other Records: Many of the early writers mention "geese" or "Canadian Geese," or even "Hutchins' Geese," and many, perhaps most, of the references to this last-named bird apply to the present *leucopareia*, and not to *hutchinsi* of the new Check-List (1931). The egg taken at Repulse Bay, and referred to by Bell (see Macoun, 1900, p. 190) may have been either of *leucopareia* or of *hutchinsi*, so far as I can see, for both forms may occur there even as they do at Southampton, or it may have been collected on one of the offshore islands. Preble (1902, p. 90) says, under *Hutchins Goose*: "Several flocks of geese referred to this species were seen on the Barren Grounds near Hubbard Point August 16." It is quite possible that these birds were Lesser Canada Geese, since by this time the period of the post-nuptial moult was probably past, and the birds were probably assembling in pre-migratory bands along the coast. Eifrig (1905, p. 237) under "*Branta c. hutchinsii*. Hutchins' Goose" says: "A typical specimen was taken June 17, 1904, in the vicinity of Cape Fullerton. Length, 27 in.; wing, 17.50; bill, 1.75. The line of demarcation between the black and white areas on the head is a *straight* slanting line." Taverner (1931, p. 34) has included this specimen in his table on the measurements of *leucopareia*.

Low's comments (1906, p. 317) are somewhat confusing, since through a typographical error the only two species of geese which he lists are *both* called "*Branta canadensis hutchinsii* (Rich.). Hutchins Goose." The first of these unquestionably refers to the Lesser Snow Goose, since the list otherwise follows the order of the A. O. U. Check-List of that time, and the latter to what he calls the "Hutchins Goose," a name, which according to Taverner (1931, pp. 34 and 37) apparently includes both *B. c. leucopareia* and *B. c. hutchinsi*, since the skins he mentions as from "Fullerton and Southampton" have been found to be representative of both these forms. Low's comments concerning the "species" are: "Common about Fullerton in the spring. Breeds along with the Lesser Snow Goose on Southampton. Skins from Fullerton and Southampton."

Mr. Ford considered this larger *Nekilik* as much rarer than the little *Nekilik* on both Southampton and Coats Islands, but was certain that both species occurred on the two islands during the summer. According to Taverner (*Ibid.*, p. 34) none of the geese taken by

Soper (1928, pp. 94 and 95) are referable to this form, so the range of *leucoparvia* evidently does not extend eastward to include Baffin Island.

7. *Branta canadensis hutchinsi* (Richardson). HUTCHINS'S GOOSE.⁷

(PL. XXII, fig. 1.)

Eskimo Name: The Aivilikmiut called this little goose the *Nekilik*, *Nukiluk*, or *Neki-liatsuk*, the last name being merely their designation of "a little goose." It should be remembered that the name for the Brant, *Nukilingnuk*, is distinctly different.

Status: The Hutchins's Goose is a common, locally abundant, summer resident all along the southern coast of Southampton Island wherever there are little lakes with small islands, upon which it may nest. It is said to be common at Kokshouktok, in the East Bay region, and in the vicinity of the great colonies of Lesser Snow and Blue Geese at Capes Kendall and Low. I did not learn anything definite as to its status at Duke of York Bay. It seemed not to be very common at Seahorse Point, where in the high country there were not many of the low-lying coastal lakes, which it so likes to frequent.

As a migrant it is sometimes so common, that I am led to believe that birds which nest on Melville Peninsula and even on Baffin Island may occasionally pass over or stop for a time at Southampton. It arrives a little later in the spring than the Lesser Canada Goose, the Lesser Snow Goose, and the Blue Goose, but considerably in advance of the Brant. In the

Measurements in millimeters of *Branta c. hutchinsi* from Southampton Island.

MALES

G.M.S. No.	C. M. No.	WING	CULMEN	TARSUS	WEIGHT
3570	110,135	376	39	70	.....
3589	110,153	281	34	76	5 lb. 9 oz.
3623	110,180	387	34.5	69.9	4 lb. 10 oz.
3624	110,181	386	34	68.5	4 lb. 5 oz.
3634	110,191	393	37.1	72.5	5 lb. 10 oz.
3635	110,192	368	35	71	4 lb. 9 oz.
3646	110,203	392	36	74	5 lb. 4 oz.
3651	110,208	406	34	74.5	5 lb. 8 oz.
3665	110,221	397	36	70	3 lb. 12 oz.
3697	110,253	389	34	69	4 lb. 12 oz.
Average		387.5	35.36	71.54	4 lb. 12 oz.

FEMALES

3590	110,154	394	33	68	5 lb. 1 oz.
3622	.....	341	32	64	.....
3625	110,182	384	35	70	4 lb.
3636	110,193	369	34	68.5	3 lb. 12 oz.
3647	110,204	374	33	67	.....
3652	110,209	364	34	63.5	4 lb. 6 oz.
3666	110,222	368	35	70	3 lb. 9 oz.
3705	110,261	374	32.5	67	4 lb. 2 oz.
Average		370.7	33.5	67.2	4 lb. 2 oz.
Average of all specimens		380	34.56	69.63	

⁷The name here given is in strict accordance with the A.O.U. Check-List (1931). The author is of the opinion that the name should be given as *Branta hutchinsi* (Richardson). BARREN GROUNDS GOOSE.

fall its migrant flocks are composed of from one to three family-groups, which travel southward together. It has never been known to winter in the region.

An extended discussion of the relationships of the three 'white-cheeked' forms of the genus *Branta* which occur on Southampton is presented under *Branta canadensis leucopareia*. Here I have attempted to justify my belief that *hutchinsi* is worthy of full specific rank, and that it is not merely a race of *canadensis*. That *hutchinsi* is decidedly smaller than *leucopareia* is obvious from the foregoing table. The greatest differences between the birds are not revealed by a comparison of skins, however, but by a comparison of the behavior of the living birds.

Taverner (1931, p. 37) gives us the measurements of eight specimens of this form, obtaining the following slightly smaller⁸ averages: Wing: 362.5; Culmen: 32.12; and Tarsus: 68.12. Our averages are, however, decidedly small for any other form of *canadensis* than the present one. In our series there is a good deal of variation in the color of the underparts, the barring in some individuals being fine and clean cut, in others rather cloudy and indefinite. The white patch on the throat frequently is marked with an indefinite, or partial, median black or blackish stripe, chiefly in the males, not so often in the females.

One specimen in the series, a male (G.M.S No. 3704) which has not been included in the above table, should be mentioned in particular. The wings of this bird are decidedly too long for average *hutchinsi*, yet the bill is obviously too short for *leucopareia*. Perhaps the individual is a hybrid. Its measurements are: Wing: 422 mm.; Culmen: 36 mm.; and Tarsus: 79 mm.

Fall Records: No Hutchins's Geese were seen about the head of South Bay during the late summer of 1929, though Mr. Ford and his son told me that they had seen numbers of them during the spring. I first noted the species at Four Rivers, on August 28, when two flocks (about fifty birds in all) were seen flying westward along the outer shore, and a pair were seen feeding among the sea-weed about half a mile out from the sandy beach, at low tide. The post-nuptial moult had apparently been completed by this time.

On August 31 at Hut Cove two flocks were seen, one of eighteen, the other of seven birds. The latter were, I believe, a family-group. They were feeding far out on the mud-flats at low tide, and were exceedingly and unaccountably wary. On September 1 at Cape Low several flocks were noted, some of which were feeding on the short grass along the shores of the coastal lakes. On September 3 I crept up on a large flock, which was feeding and resting near a low gravel-ridge not far from the salt-water.

On September 11 a flock of twenty birds was seen at a distance along the outer rocks at Seal Point, feeding among the sea-weed and grass just back of the beach. On September 20 three were seen not far from the mouth of the Anderson River. I did not record any other Hutchins's Geese during the fall; the Eskimos at Native Point saw them as late as October 10, however, according to the reports of Muckik and Kooshoak.

The absence of this species about the Post during the late summer of 1929, in a region, where they were abundant during the following spring, puzzled me a little. I am now inclined to think that by the time I reached Southampton (August 17) most of the geese were quietly passing through the latter stages of the post-nuptial moult, perhaps in the remotest of the coastal lakes they could reach. It may be that the egg-gathering of the Eskimos had had something to do with the temporary disappearance of the birds.

⁸The apparently relatively greater length of the wing in the Southampton birds may be due in part to the way in which the specimens were prepared, the natural curvature of the primaries possibly being reduced by the folding of the wings on the back.

Spring Records: On May 25 a fair-sized flock of Hutchins's Geese were observed at the floe at Native Point by the Eskimos. These birds appeared not to be mated. They were not feeding; they drifted for a time in the water, then walked out upon the ice.

On June 1 a pair were seen flying eastward along the shore of the frozen bay not far from the Post. On the same date, Father Fafard saw a flock of about ten birds flying north-eastward across the bay. On the following day, Amaulik and Kyakjuak saw a small flock flying over Prairie Point toward Itiuachuk. On June 7 three birds were seen flying over the Post and a large flock passed over the bay headed for the high land at Itiujuak. On June 8 several small bands, some pairs which appeared to be mated, and a few single birds were seen flying toward the head of the bay. They gave forth a high-pitched, *cronking* outcry. On June 10 I watched several birds, which appeared to be courting. They were frequenting the snowless patches of ground, where they dignifiedly walked about, craning their necks this way and that, bowing and *cronking* in their high, falsetto voices. On June 11 several small flocks were seen. By this time the birds all seemed to be mated, but they went about in companies of six or eight. In the early morning we usually heard them north of the Post. At about 10 o'clock they rose with a good deal of clamor to make their way to the head of the bay, where they fed, rested for a time, then returned.

On June 12 a small male (gonads much enlarged) was shot at the mouth of the Koodlootok River. This was the first specimen I was able to preserve. On June 13 Jack Ford and Santiana shot two females (ova considerably enlarged) from the large flocks they saw at the head of South Bay. On June 15 Jack Ford found a nest just ready for eggs on a small island in a little lake not far from the Post; and I for some time watched a pair, which acted as if they had a nest in the vicinity. On June 16 early in the morning I found a nest containing two eggs on a small, grassy island, about forty yards from the shore of a rather large lake two miles inland from the frozen bay. There was much ice in this lake, and I was able to make my way out to the island by leaping from chunk to chunk. The eggs were uncovered. When I returned early in the afternoon I found the female on the nest, and the male standing nearby, his head held downward as if he were trying to hide. As I drew nearer, he snaked his way slowly to the water's edge, slipped quietly in, and swam off rapidly, *cronking* loudly. When within about forty feet of the nest, and still trying to make my way along the irregular and treacherous ice-chunks, I noted that the tone of the male changed a little and suddenly the female *sprang* from her nest and flew to her mate. In the nest were now three eggs. The nest was a broad cup, about five inches deep, which appeared to me to have been in use for several seasons. It was situated almost in the centre of the island, and was not sheltered in the slightest by any stone or vegetation. On returning to this nest the following day, I found no male standing guard. After wading out through water waist-deep (the ice had now broken up) I found that Herring Gulls had eaten the eggs and strewn the down of the nest all over the islet. I am inclined to think that the gulls robbed the nest shortly after I frightened the geese away.

On the same day (June 17) I found another nest, containing three eggs, on a tiny rocky island about three square yards in extent and about fifty feet from the shore of a large lake. The cup of this nest was fully six inches deep. Both birds were present when I found the nest; the sitting female's neck was extended along the ground in such a way as to make the bird practically invisible from the shore.

On June 18 at the head of South Bay we found fifty-seven nests, all on islands in shallow lakes. Many of these were so close together as to suggest a sort of colony. In one small lake there were three nests, one on each of the only islands available. In several lakes there

were two islands, each with a nest; but nowhere did we see two nests on one island. Most of the cups, though newly lined, were empty; four held three eggs, however; five held two; and three held one. Since there was but little down in any of the nests, the eggs were covered with wisps of dry grass. We found the nests easily, for nearly every suitable islet had its pair of birds, which began to *cronk* and move about excitedly as we approached. Several specimens were secured on this date; the gonads of all were much swollen.

On June 19 Jack Ford, Santiana, and I examined about forty nests on the plain below the gravel-plateau at Itiuchuk. In one large lake were five nesting pairs, each pair occupying a little island. All the nests contained eggs, but only one held six. In this nest there was a great deal of down. On June 20, at Prairie Point, we found many more nests, and collected several pairs of birds. On June 21 Jack Ford found many nests and collected two females, one of which was practically bare of feathers on the belly.

On June 23 a male and female, together with their nest and six slightly incubated eggs, were collected at Prairie Point. The nest was situated at the end of a peninsula in a broad, very shallow lake, about two miles inland from the bay. It was a deep depression in the top of a four-foot mound, well-lined with down. The female bird was very fat, whereas the male was quite thin.

On June 25 four pairs of birds were noted in the vicinity of Poorhouse Hill. I observed that the throat-patch of the female birds was as a rule whiter than in the males; in many of the males this patch was crossed by a median black line. On June 30 in a long excursion to the north of the Post I encountered about thirty nesting pairs, the males on guard and the females incubating. Virtually all the nests held five or six eggs, though on July 2 Keetlapik brought in a complete set of three eggs which were heavily incubated.

The first young birds were seen on July 14. On this date I found one nest with only two eggs, one of which was just hatching, and several newly hatched broods of five and six young with their parents. The old birds were frantic when I bore down upon their broods; they flopped about in the water, simulated diving, *cronked* loudly, and trailed off, as if wounded. Sometimes they came up to within a few feet of me and lay gasping as if at the point of death. The young, which kept up a feeble cheeping, swam well, but dived poorly. When first frightened they all disappeared under water. When they came up a second or two later they were short of breath; and the next time they tried to dive they could not get under, but stuck their heads down and paddled along as best they could, their big feet kicking out comically. When I walked away from one of the broods, the male bird escorted me, half running and half flying. Sometimes he lay on his side and simulated a crippled condition; then again he rose and flew along with his legs trailing. He led me thus fully half a mile.

On July 18 Father Fafard found many broods of young on the inland lakes, and brought me two specimens.

On July 30 Noah reported that all the geese in the Koodlootok River region were in the flightless stage of the moult. At about this time very few birds were seen anywhere near the head of South Bay. I am inclined to think that at this season the old birds lead their young to the inland ponds, where there is probably a sufficiency of animal and vegetable food, and where there are not so many natural enemies as there are along the coastal lakes.

Annual Routine: Hutchins's Goose arrives later in the spring than the Lesser Canada Goose; the latter, larger bird making its way inland sometimes long before the snow has started to melt from the lowlands, the former usually waiting until there are extensive bare patches on the ridges and tundra. From the behavior of birds in the early spring I judge

that they are not as a rule mated when they arrive. The birds fly about in flocks and there is a good deal of rivalry among the males. When the nesting territory is chosen, however, the mated birds are very faithful to each other, and there is no chasing of one female by several males as in the case of the Old-squaw and King Eider.

The eggs, which number from two to six, are laid daily, after the set is begun. The first eggs are usually laid about June 15. If we may infer that most of the nests hold full, fresh sets by June 19, and that in most cases the young hatch about July 15, the period of incubation must be about 27 or 28 days. According to Bent (1925, p. 209) the incubation period in the Canada Goose "varies from 28 to 30 days."

The young swim readily, but do not dive well. As soon as they are strong enough, they travel across country to the inland lakes, where they grow larger, while the parent birds undergo the post-nuptial moult. In latter August the family-flocks make their way out to the coast, where they feed on short grass and various forms of salt-water animal life. They usually leave the Island about the end of September.

The principal enemy of this little goose is probably the Eskimo, who kills the adult birds for food and gathers the eggs all through the summer, taking them all whether "good" or "bad." The Herring Gull destroys a good many eggs, too, as do also the jaegers to a lesser extent. The Arctic Fox does not get many eggs, because the nests are built on islands.

Fleshy Parts: I carefully compared the fleshy parts of freshly killed Lesser Canada and Hutchins's Geese and could not find any constant differences between them. It seemed to me that the feet of the smaller species were sometimes more brownish, or brownish olive; but these shades were so indefinite that I could not be sure they were not the result of colors reflected from surrounding objects upon the smooth scales.

The fleshy parts of the newly hatched young, which I sketched from life on July 14, may be described as follows: eyes, deep brown; eyelids, dull greenish gray; bill, dull greenish gray, lightest about the nostril and at the base of the upper mandible, darkest just back of the nail on both upper and lower mandibles; nail of the upper mandible pale horn-color; feet dull brown, almost gray-brown, darkest on the webs.

Other Records: Many of the references of earlier explorers in this region to 'geese' doubtless apply to this 'race,' although, where no statement as to size is made, there is naturally a question as to which form was actually encountered. Richardson's original description of this bird (Swainson and Richardson, 1831, p. 470) was based upon a bird taken on Melville Peninsula, just north of Southampton. A 'goose' egg, taken at Repulse Bay and mentioned by Bell (see Macoun, 1900, p. 190) may have been of this form. Preble (1902, p. 90), under "*Branta canadensis hutchinsi* (Rich.). Hutchins Goose" states that several flocks "were seen on the Barren Grounds near Hubbard Point August 16." It is my feeling that these birds might just as easily have been *leucopareia* as the present form. Eifrig (1905, p. 38), under "*Branta c. minima*. Cackling Goose" (which he questions) says: "There is a skin in the collection which to all appearances belongs here. It was identified as this form also by Mr. E. White, who is familiar with this subspecies from the Pacific coast. It is much smaller than the preceding [*Branta c. hutchinsii* = *Branta c. leucopareia*]; the black area of the head is rounded out below the eyes, not forming a straight line, and the depression at the end of the bill is more pronounced. Length, 24 [inches]; wing, 15.50; bill, 1.25. Both species [that is, '*B. c. hutchinsii*' and '*B. c. minima*'] were rare at Fullerton and Southampton."

Taverner (1931, p. 37) has identified the above specimen as the present form. The western Cackling Goose is, of course, an entirely different sort of bird. Furthermore, Eifrig was wrong in speaking of this bird as 'rare' at Southampton. He probably inferred it was

rare because only one specimen was included in the collection, or because in the notes written by Low upon the short visit his party made in the Cape Kendall region, not much mention was made of the small geese, which might have been collected without much trouble, had they given their time to the matter. Low's own statement (1906, p. 317) in fact leads us to believe that a good many of these geese were actually seen. Under 'Branta canadensis hutchinsii. Hutchins Goose' (the only form of this group mentioned) he says: "Common about Fullerton in the spring. Breeds along with the Lesser Snow Goose on Southampton. Skins from Fullerton and Southampton."

Soper (1928, pp. 94 and 95) has a good deal to say about "small Canada geese" on southern Baffin Island, where this form evidently is a common breeder, and Taverner (1931, p. 37) gives measurements and a complete description of seven specimens taken by Soper on Baffin Island, and of the one specimen, referred to above, taken on Southampton Island in 1904 by the *Neptune* expedition.

Mathiassen does not mention this bird among the species he noted in the Duke of York Bay region. Mr. Ford told me that these little geese were quite as abundant on Coats Island as on Southampton. Mr. Swaffield took a specimen (wing measuring 387 mm.) at Mansel Island in the summer of 1930 (Sutton, 1932a, p. 41). We did not record it from Chesterfield Inlet during the late summer of 1930 (Sutton, 1931c, p. 156).

Branta canadensis minima Ridgway. CACKLING GOOSE.

This clearly marked western goose, which probably should be accorded full specific standing, has never been seen or taken in the Southampton region to the best of my knowledge. Eifrig (1905, p. 238) gives us a description, including measurements, of a specimen he supposed to be of this race, though he was evidently in some doubt as to his identification. Taverner (1931, p. 37) has definitely cleared the matter up for us by including the measurements of this specimen with those of his series of "*Branta hutchinsii*."

8. *Branta bernicla hrota* (Müller). AMERICAN BRANT.

(Plate XXIV, fig. 1.)

Eskimo Name: The Aivilikmiut called the Brant the *Nugulungnuk* (all the "u's" pronounced short) or *Nukilingnuk*, which is one of the diminutive forms of *Nekilik* or *Nukiluk*, the name of the Canada Goose. *Nekilik* is an imitation of the conversational call-notes of any of the geese of the genus *Branta*. According to Soper (1928, p. 95) the Baffin Island Eskimos call the bird *Nerdlernak*. Nelson (1881, p. 131) says that the Norton Sound Eskimos of Alaska call the Black Brant, *Branta nigricans* (Lawrence), the *Luk-lug-u-nuk*; and Mr. Brandt tells me that the Alaskan Eskimos with whom he was acquainted called the Black Brant the *Nuck-la-nock*. All these words are obviously similar, probably dialectic variations of the same word.

Status: The Brant is rather a rare summer resident, which we found actually nesting only at Prairie Point and at Cape Low. The Eskimos told me that eggs had been taken at several places along the western and southern coasts, especially in the Cape Kendall region, at East Bay, at Native Point, and near the mouth of the Anderson River. We noted it as a fall migrant at several points along the southern coast, where it may be that the flocks seen were young birds, which had been reared along the margins of the coastal lakes, accompanied by their parents. It arrives very late in the spring. Flocks continued to arrive at Prairie Point until mid-June of 1930, when many of the familiar smaller birds had eggs in their nests.

Fall Records: On August 25, 1929, at Prairie Point Jack Ford and I came upon a family

of four young and their parents swimming about in a large shallow lake not far inland from the coast. Jack saw these birds before I did, took his clothes off, and waded in after them. They swam rapidly, and *dived* a good deal when pressed closely. Finally he killed one of the young with a stone, just as I came up with the gun. None of the birds, adults or young, could fly.

Since we had apparently cornered the birds, I tried to photograph them, but had no success. I shot both adults and then tried to capture the remaining young alive. We chased them finally to the water's edge, whereupon they pulled themselves out awkwardly, lifted their wide, scrawny wings, stretched out their necks, and ran across the rough limestone chunks to one of the larger lakes nearby. I dropped gun and camera and ran as fast as I could, but did not overtake them. They did not use their wings at all, though these were lifted, and they swung from side to side a good deal as they progressed, covering ground with a speed which should rouse the admiration of a fox. I had to shoot in order to secure another specimen.

When this family was first seen, the female and young were in front, the male bringing up the rear. Their call-notes were low, rather duck-like *quacks*.

In all the four specimens collected on this date the flight-feathers of the wings were about half-developed. On the young birds a considerable amount of down yet adhered to much of the plumage, especially on the head, neck, and along the flanks. The adult female appeared to be in the midst of a complete post-nuptial moult, and pin-feathers came out by the hundred as I skinned her. The male, however, was in handsome, fresh plumage, save for the large feathers of the wings. Of all the specimens only the adult female was conspicuously fat. All had been eating vegetable matter, grass and roots, which they had found along the edge of the lakes. The two young birds were females.

On September 2 at Cape Low several large flocks of Brant were seen along the coast, and an adult male in full plumage was secured. In this specimen the post-nuptial moult had been entirely completed.

On September 3 a small flock (about ten individuals) were seen feeding along the bank of the Ranger River not far from our camp. By carefully stalking these birds Amaulik succeeded in securing two, both adult females, which were not especially fat, and which had not quite completed the moult.

The Brant at Cape Low did not *honk*; they had a sort of soft, low *quack* or *quock* which they varied with rolling, guttural sounds, which apparently were accompanied by noisy crunchings of the mandibles.

On September 5 the Eskimo, Tommy Bruce, noted a large flock flying eastward at Four Rivers. On September 8 I watched two birds preening themselves, as they stood at the edge of a small lake not far inland at Four Rivers. On September 20 at about noon a flock of about one hundred birds flew noisily past our camp near the Anderson River moving westward. Later in the day other flocks passed westward, just above the beach. At about 4 o'clock in the afternoon a family-flock of six alighted not far back from the shore on a grassy plain. These birds were not particularly wild, and I had opportunity to watch them walking rapidly about, nibbling and jerking at grass and roots. The adults were constantly on the watch while the young ate. All of them gave an incessant, low, rolling *quonk*. When I pressed them too closely they rose noisily to a few feet above the ground and flew inland, alighting on the bank of a small lake. I finally shot one of the young birds. After being fired at, the flock flew back to salt-water and alighted not far from shore. This family-group seemed to pay no attention to the larger, migrating flocks which were going by. The

specimen taken was only slightly fat. It proved to be a female. The plumage was completely developed.

On September 21 another flock of six birds were seen flying westward at the mouth of the Anderson River. None was seen after this date.

It will be noted that all flocks of Brant observed during the latter part of the migration season were flying westward. I am inclined to infer from this that this species congregates in considerable numbers somewhere in the region and moves southward along the west coast of Hudson Bay. In this respect the Brant may be quite different from the Blue and Lesser Snow Geese, both of which often fly down the east coast of the Bay.

Spring Records: The Brant during the spring of 1930 was the latest of the summer birds to arrive. Eskimos told me they thought they had seen a small flock at Native Point on June 14; but the first authentic record I secured was of a flock of about twenty, seen rapidly flying northward along the shore at Itiuachuk, on June 18. They were very noisy. They passed inland at the mouth of Ford River, headed for the high country back of Itiujuak. Perhaps they were making for the flat country at East Bay, where the natives say they nest in considerable numbers. On June 19 three small flocks (about twelve birds in each) were seen flying northward at Itiuachuk and Prairie Point. On June 20 two birds, very likely a mated pair, were seen circling about among the lakes at Prairie Point, not far from the ground. On June 25 natives found a nest containing five fresh eggs along the south shore of Prairie Point. One bird was on the nest, the other on guard nearby, according to report. These eggs were not saved. Jack Ford shot a handsome male nearby, perhaps one of another nesting pair. This specimen was rather fat. The gonads were much enlarged. On July 1 a flock of five, apparently all adults, were seen at the mouth of the small river, which empties into South Bay just west of the Post.

In the region of Cape Kendall according to reports the Eskimos found several nests not far from the Blue Goose and Lesser Snow Goose colony. Mr. Ford and his son told me that on their annual eggging expeditions they usually found several Brant nests at Prairie Point and even along the lakes near the Post; but to the best of my knowledge no nesting pair was seen during the summer anywhere near the Post.

Annual Routine: The Brant arrives in flocks from the south late in spring. It apparently is not mated when it reaches Southampton, and these flocks may be composed of birds, which nest to the north of South Bay, or perhaps even north of Southampton. The nest according to Mr. Ford and his son is usually placed on dry ground not far from a lake in a situation similar to that chosen by the larger geese. Only the female incubates; the male stands on guard. By the time the young are hatched and able to swim about, the parents lose their flight-feathers. During late summer both old and young birds swim about in the large lakes, waiting for their wings to become fit for flight. The young, while yet unable to fly, can swim with great rapidity. Both adults and young may dive, if they are hard pressed.

The family-flocks stay together until the young are fully developed and flying perfectly. Then gradually they merge with other flocks, though they may continue to feed and fly together in family-groups, even after the larger flocks have formed. In the latter part of September the family-flocks which have lived in the eastern half of the Island move westward, perhaps to some well-known feeding-ground, whence they may move southward at the approach of cold weather to Coats Island, or to the west coast of Hudson Bay.

The Arctic Fox is probably the worst enemy of the Brant, aside from the Eskimo egg-gatherers. Jaegers and gulls probably do not often catch the downy young, though they occasionally steal the eggs.

Fleshy Parts: The irides in both adults and young are dark brown, somewhat duller, perhaps, in the young. The bill and feet are dark gray, or black.

Other Records: Swainson and Richardson (1831, p. 469) state that this species breeds in great abundance on the coast and islands of Hudson Bay. A specimen collected at Repulse Bay by Dr. Rae is recorded in the British Museum Catalogue of Birds. Preble (1902, p. 90) mentions the species, but gives us no records from Southampton Island. Eifrig (1905, p. 238) says: "A few breed around Cape Fullerton. Not common." Low (1906, p. 317) does not even mention the species. Mathiassen did not record it in the Duke of York Bay region during the fall of 1922. Mr. Ford told me that it nested commonly, though locally, on Coats Island, during his residence there. Soper (1928, p. 95) gives us a few records from Baffin Island and regions nearby, where it is apparently not very common. Mr. Swaffield took an adult at Mansel Island on September 15, 1929 (Sutton, 1932a, p. 41). We did not see it in the Chesterfield region during the late summer of 1930.

Branta leucopsis (Bechstein). BARNACLE GOOSE.

Richardson (1825, p. 364) regards this species as rare and accidental in Hudson Bay. The only specimen taken anywhere in the region of Southampton Island, so far as I have been able to determine, is that taken at Boas Lake, near Amadjuak Bay, Baffin Island, in August, 1924, and which has been reported by Taverner (1927, p. 221) and Soper (1928, p. 95).

Genus ANSER Brisson.

Anser albifrons albifrons (Scopoli). WHITE-FRONTED GOOSE.

Edwards (1750, pl. 153) figures a specimen of this goose from Hudson Bay, calling it the 'Laughing Goose.' Barnston (1860, p. 257) says the species is seldom seen in the southern part of Hudson Bay, but implies that it is commoner farther north. There is a specimen (presumably of this race) in the British Museum, collected by Rae at Repulse Bay, according to the Catalogue of Birds. Rae's own comment (1850, p. 64) on his noting of the species is of interest. He says, under date of August 11, 1846: "a flock of laughing geese (*anser albifrons*) flew past quite close to me; but having only my rifle, I could but send a ball after them and missed as was to be expected." None of the Eskimos who were acquainted with the Repulse Bay country knew anything about this goose, so far as I could learn. Kumlien (1879, p. 99) recorded it at Cumberland Sound, Baffin Island. Bent (1925, p. 195) calls attention to the apparent hiatus in the breeding range of this form, which occurs between "the district of Mackenzie and Greenland." Soper (1928, p. 94) evidently considers the bird very rare on Baffin Island. He mentions one specimen taken at Issortukdjuak fiord.

Genus CHEN Boie.

9. *Chen hyperborea hyperborea* (Pallas). LESSER SNOW GOOSE.

(Plate XII, fig. 3)

Eskimo Name: Both Aivilikmiut and Okomiut used the word *Khanguk* when referring to this species. The similarity of this name to that for the Blue Goose is marked. The first syllable in both words is an imitation of the characteristic cry of warning in both species, and this use of the same root with different qualifying suffixes suggests that the Eskimos themselves probably regard the two birds as closely related. Certain hunters even expressed a suspicion that the *Khavik* might be a *Khanguk* only partly grown. All the natives appeared to be aware that the two species interbred occasionally. One man told me that aged individuals of both the *Khanguk* and *Khavik* were white with black on their wings. There are, in the Eskimo language, many instances where similar words refer to strikingly dissimilar

objects. To my way of thinking, however, the similarity of the two words in question indicates that the Eskimos regard the two species as closely related, and with this belief Soper (1930d, p. 38) evidently concurs. No Eskimo ever applied to either species, so far as I was aware, a term in any way reminiscent of the onomatopoetic *Wavy*, *Way-way*, or *Wewais* (Barnston, 1862; cf. Bent, 1925, p. 168) of the Indian tribes to the south; nor did they use a separate word for the gray-colored young of either the Lesser Snow or Blue Goose.

Status: The Lesser Snow Goose occurs as a summer resident all over the western half of the Island. It is especially common at Cape Kendall, and irregularly so at Cape Low. It does not nest far inland. It is much commoner than the Blue Goose, with which it frequently associates and occasionally interbreeds. I think it probable that all the Lesser Snow Geese, which come to Southampton during the course of the spring, nest there; and that those individuals, which pass to the northward to breed, probably do so either to the westward or the eastward of the Island.

Only two specimens (both females) of this form were preserved. Their measurements are as follows.

Measurements in millimeters of *Chen h. hyperborea* from Southampton Island.

FEMALES				
G.M.S. No.	C. M. No.	WING	CULMEN	TARSUS
3569	110,134	413	60	80
3667	110,223	400	53	85

Fall Records: The Lesser Snow Goose was not seen about Coral Inlet, either near the Post, or at Prairie Point, during the late summer or fall of 1929, though both Mr. Ford and his son had seen flocks passing north and west during the spring. Several nests had been found at Prairie Point during June; and the Eskimos had brought in quantities of eggs from the Cape Kendall region during July.

At Cape Low on September 2, however, we encountered tremendous flocks of these magnificent birds. The first were seen about 10 o'clock in the morning. I was crouching behind a low gravel-ridge watching a pair of Red-throated Loons and their half-grown young. Suddenly I was aware of a moving shadow in the moss near me and of the rush of wings. Looking up I beheld four white geese swiftly flying toward a lake nearby. Their silken plumage somehow so caught and refracted the rays of light as to present a rosy-orange color on their shadowed under sides. The flock made no sound until I moved to see them better; then they set up a loud, irregular, falsetto honking, circled around me once, and sped across the lake to join a distant flock, which was feeding on the grass-lands, and which up to this time I had not observed.

All that day and the next Lesser Snow and Blue Geese in closely associated companies were seen. Flocks of hundreds, perhaps thousands, swept along the lake shores, usually a mile or so inland from the salt-water, now pausing to rest or to graze, now rushing upward with a mighty din to circle about aimlessly and to settle once more. I tried stalking the birds with my shot gun, but was unsuccessful. Even my rifle-armed companions could not get near enough for a shot. The country was exceedingly flat of course, and there were no trees, stones, or embankments behind which we could approach. The geese were feeding on grass, which grew along the margins of the wide shallow lakes. Here among the innumerable tracks in the mud were a few feathers, and droppings which were obviously fresh.

Their lines of flight were not, as a rule, V-shaped. Sometimes the birds flew abreast, or "Indian file," the whole line shifting gracefully, now this way, now that, the vibrant pink of

their shadowed underparts glowing against the gray sky. As the flocks flew up from their feeding or resting grounds, they sometimes had the appearance of a flurry of snow, and the wild clamor of their voices added to the impression of reckless tumult. Among them were numerous dark-plumaged birds, many of them, no doubt, their own young, others both adult and young Blue Geese. The white birds, however, were considerably more numerous than the dark-colored individuals, indicating either that relatively few young had been successfully reared, or that, due to immaturity, many of the apparently full-grown birds had not bred. While these large flocks were feeding I noted no tendency on the part of the family-groups to keep together. After they had risen high in air, however, they arranged themselves in smaller companies, some as if in family-groups. According to our observations and to the reports of the Eskimos, the adults and young always migrate southward together.

It struck me as peculiar that birds of such an isolated place should be so wild; the larger and usually very wary Whistling Swans were not nearly so restless, and most of the shore-birds were quite fearless. Much of the apparent wariness of the birds was due basically, I now believe, to a desire to be off for the south. All the young birds were, so far as I could see, flying perfectly; and the post-nuptial moult had apparently been completed. Perhaps the food-supply for the gathering hordes was inadequate. At any rate, whatever the cause of their state of confusion, the birds seemed to derive some satisfaction merely from flying about and from cackling and yapping loudly. Their feeding and resting periods were short and sporadic. On September 3 at about noon we saw most of the geese tower higher and higher and finally separate into neatly arranged companies of from four or five to thirty birds; heard them change their tone of voice in some indescribable way; and watched them actually leave the region, apparently for good.

We did not find any sign of a nesting colony at Cape Low. On the extensive feeding grounds all the feathers examined had, obviously, just been plucked or preened from the birds and the droppings were all fresh. We might, of course, have missed the precise place, which the natives had visited in previous years. We all came to the conclusion, however, that the geese had shifted their nesting-grounds to the north, to the shore of the Bay of God's Mercy, where Shookalook and other natives had reported them as exceedingly abundant during the spring and summer.

Spring Records: A flock of six Lesser Snow Geese appeared on May 15 at the edge of the floe south of Munnimunnnek Point. The natives believed these birds mated. On May 18 one was seen at Bear Island. This individual had flown in from the open water in company with a Lesser Canada Goose. It spent most of its time standing and walking about in the snow. It did not peek at the snow, as if in search of food.

On May 31 a large flock passed over Coral Inlet, apparently headed northeastward for a nesting-ground near Itiujuaq. On June 5, while I was walking through the deep damp snow near the mouth of the Koodlootok River, two handsome birds (probably a pair) flew not far above me, calling in dignified but shrill voices. They were headed toward the west, where there seemed to be extensive snowless areas along some of the higher gravel-ridges. In these bare areas, however, I found no goose droppings or feathers. On June 6 and 8 a pair were seen flying toward the head of South Bay. On June 9 a flock of four and a solitary bird were noted at Prairie Point.

On June 10 huge flocks were seen at the Post, flying high, and headed westward. They had evidently come to Southampton from the *south and east* and not from the west. There is a possibility, of course, that there are colonies of white geese on Southampton, about which the Eskimos have never learned, and these flocks may have been such a colony re-

turning *en masse* to their summer home; but I think it probable that they were the Cape Kendall birds.

On June 12 additional flocks were seen flying westward over the Post, and a very fat female specimen, weighing 5 lb. 9 oz., with much enlarged ovaries, was shot at the mouth of the Koodlookok River by the native Keetlapik. I noted that the inner surface of the delicate skin of this bird was marked with exceedingly fine grayish lines, which presented almost the appearance of vermiculations. I do not know what caused this peculiar coloration. The gizzard contained little aside from gravel.

On June 13 Jack Ford shot four specimens on the plains near Itiujuak. Two of these (sex undetermined) were fed to the dogs. The two brought home, a male and a female, were not weighed, because their viscera had been removed. The ovaries of the female were exceedingly large. It is likely that she would have laid eggs in a few days. Jack noted great numbers of Lesser Snow Geese, Blue Geese, and Whistling Swans in this region. The birds were passing back and forth constantly, often not far above him and his Eskimo companion. It is highly regrettable that, due to the impossibility of transporting outfits over the snowless tundra and particularly across the swollen waters of the streams, we could not study this nesting-ground a little later in the season. We did, however, make a two-day attempt to reach the region, but had to give up, because the dogs could not haul our *komatik* through the gravel, mud, moss, and lakes.

On and about June 15, Tommy Bruce observed and shot many Snow Geese along the north shore of the Bay of God's Mercy. Here he found hordes of *Khanguk* nesting between the wide, shallow lakes, intermingled with the *Khavik*. He was fairly bewildered by the abundance of birds. Their clamor was deafening. All about his camp they flew ceaselessly. He found *amishualuuet* ('very many') nests, nearly all of them with five or six eggs; and he, his family, and his large team of dogs lived for several days on geese and goose-eggs. All the birds near his camp appeared to be mated, the males standing guard as the females incubated. Resting birds frequently stood on one foot or ran along waving their wings wildly, calling loudly to pairs or small flocks, which were flying over. They fed on grass, which they nibbled off, or pulled up as they slowly walked along. Their note of alarm was a deep, hoarse "*kha-ah*."

Tommy Bruce collected several birds and eggs for me, but could not bring them in, because his *komatik* was overloaded. He found what he considered full sets of five and six eggs as early as June 13, the season being earlier as a rule in the Cape Kendall region than at Coral Inlet. He did not see more than eight eggs in a nest, nor fewer than four. The usual clutch was six. The nests were built on the driest available ground, among the grass, between the lakes. Early in the season the nests contained but little down; later, however, as more eggs were laid, more down was added and eventually there was enough to cover the eggs completely when the female was not incubating. Many newly moulted body-feathers were found all about the colony; large quills which were noted and brought in for my examination, however, had obviously been moulted during a previous year. It would appear from these data that the midsummer moult may be in progress at the time the birds arrive in spring, though the losing of the remiges and rectrices does not take place until later in the season, probably well after the young have hatched.

Several more or less isolated nesting pairs were discovered in the region of South Bay at about the time Tommy Bruce was living near the large colony at Cape Kendall. The first of these was found by Jack Ford at Itiuachuk, on June 18. The nest, which held four fresh eggs (possibly not a complete set) was placed near the end of a long, narrow point of

land, which projected from the shore of a large lake about four miles inland from the Bay. The land here was comparatively dry, the ground about the nest having little vegetation. The parent birds were very wary. When first seen, the male was on guard not far from the nest, and the female on her eggs. The nest contained very little down.

On June 19 I noted a pair flying toward the gravel-plateau at Itiujak, where they probably had a nest. On June 20 at Prairie Point I found a well built nest, containing four fresh eggs, situated on a narrow strip of gravelly land between a little pond and a large, shallow lake. I had seen the guarding male from afar and approached cautiously. As I drew nearer, he walked slowly toward the shore of one of the lakes, giving me no clue as to the whereabouts of the nest. All at once, almost under foot, the incubating bird stood up, ran clumsily a short way and rose noisily into the air. Though pure white and scarcely sheltered at all by the grasses about her, she had escaped detection, partly because she had held her neck low, partly because the shadow of the grasses had broken up the whiteness of her back, and partly, perhaps chiefly, because the male had kept himself in evidence so constantly. After the female flew off, the male quickly joined her. Immediately they were beset by a clamorous mob of Herring Gulls. They circled once or twice, calling constantly, then alighted about half a mile away, where they appeared to preen and graze. I waited nearby. The gulls promptly drifted down toward the nest. I shot at them to drive them away and, of course, frightened the geese. After taking photographs, I collected the eggs. The nest was not heavily lined with down. It was placed among the gravel between several thin clumps of grass, about forty feet from the edge of a pond, and two hundred yards from the shore of a much larger lake. When I last saw the parent birds they were standing side by side on the tundra, about a mile away.

On June 20 the Okomiut Eskimos at Cape Kendall gathered hundreds of eggs, eighty of which they brought to the Post on July 10. One set of six they had kept separate and these I was able to save. They reported the *Khanguk* as about twice as abundant as the *Khavik*. All the eggs they gathered were fresh.

As noted in our discussion of the Blue Goose, a nest of mixed parentage was found and collected at Prairie Point on June 25. On the same date, the female of another, unmixed pair of *Khanguk* was shot at Prairie Point not far away. In this specimen the region of the belly was virtually devoid of feathers and the skin was thick, wrinkled, and flabby. The inside surface of the skin showed fine, grayish lines. The bird weighed 5 lb. 2 oz. The gizzard was empty.

On July 14 Father Thibert saw several flocks of white geese, perhaps forty birds in each flock, flying eastward over the Post. It is not known where these birds were going, but they were high in air, and the flight had the appearance of a migration rather than a daily quest for food. Perhaps they were non-breeding birds; or they may have been birds, the nests of which had been repeatedly robbed, and which had therefore given up an attempt to rear a brood during the brief remaining period of the summer.

Annual Routine: The Lesser Snow Geese return from the south sometimes long before the snow and ice have melted from their favorite feeding- and nesting-grounds, usually during the first week of June. If they find the tundra covered with snow they swim about in the salt-water or rest on the ice at the edge of the floe. What they eat at this time I cannot say. They do not dive, so they may have to live upon such bits of sea-weed as they find attached to the ice, or upon crustaceans, which swim about near the surface. The earliest arrivals are eager to come inland to the ridges, where they can nibble at lichens, pull up roots, and swallow the coarse gravel. At Coral Inlet they make their way northward by

way of Bear Island, where they rest and feed, waiting for the sun to melt the winter drifts.

Many of the *Khanguk* are mated when they reach Southampton; others arrive in flocks and mating apparently goes on after the nesting-grounds have been reached. All of the birds, which I noted in the spring, appeared to be pure white, and the Eskimos told me that they rarely saw a bird which appeared to be other than a full adult anywhere in the Cape Kendall region, save during late summer when the young were abroad.

I did not witness any courtship antics. The Eskimos, however, told me that the birds were very noisy during the mating season, and that they chased each other a good deal, both while on the ground and in the air. The pairs feed together early in the morning and in the evening on a favorite meadow, where they may wade out into the shallow water to preen and bathe.

The nest is situated on dry ground at the edge of a lake, sometimes at some distance from the water's edge, and often three or four miles inland from the salt-water. There is little down in the nest at the time the first egg is laid, but, by the time the set is complete, the lining is thick and warm, and capable of covering all the eggs while the parent is away from the nest. From four to eight eggs are laid, but the set is usually six. Only the female incubates. The male stands on guard, usually not far from the nest. The two birds are devoted to each other, and stay together all the time, during the period of incubation, while the young are attaining full size, at the start of the southward migration, and, perhaps, even during the winter. It is my belief that these birds frequently mate for life; but I think that if one mate is killed, another is taken during the winter or in the following spring.

Unfortunately, I cannot offer much information as to the mid-summer activities of the birds, since I did not see the downy young, nor the adults during the period of the post-nuptial moult. The Eskimos told me that the old birds sometimes led their young inland a way, while they were gaining their new plumage. In the fall the family-groups gather in large flocks at favorite feeding-places and make ready for their southward migration. They leave during the first week in September. It is possible that they occasionally fly westward or southward on leaving the Island, but large flocks are known to visit Coats Island to the south and east, and they were seen leaving in this direction during the fall of 1929.

The natural enemies of the adult Lesser Snow Goose are few. The Eskimos do not often kill them for food, unless the geese happen to be very abundant. The eggs, however, are gathered eagerly by the natives, and nests are often destroyed by gulls, jaegers, foxes, and ravens, especially if for some reason or other the eggs are left uncovered, while the parent birds are away. So far as I could learn the Eskimos never organize mid-summer drives for capturing the adults and young during the period when they cannot fly. Young birds doubtless have many enemies, however, chief among them the Arctic fox.

Fleshy Parts: Soper (1930d, p. 20) says that the colors of the bill, feet, and legs of the Lesser Snow Goose are "indistinguishable from those of the Blue Goose," and of the latter bird he gives us a very full description. I have not had an opportunity to compare freshly killed Blue and Lesser Snow Geese, so further remarks here are unwarranted.

Other Records: References to Snow Geese in the literature at hand are numerous; but there evidently has been a great deal of confusion as to which kind of Snow Goose is found in this region. Thus Preble (1902, p. 89) includes all his Snow Goose material under "Greater Snow Goose, *Chen hyperborea nivalis* (Forst.)", and gives us the following footnote: "In some of the cases cited the species has been recorded as *C. hyperborea*, but I have assumed that the eastern form is referred to." The American Ornithologists' Union Check-List (1931, p. 41) restricts the breeding range of the Greater Snow Goose to "McCormick Bay,

Greenland," and "north Baffin and Ellesmere islands," and states that in migration it is found "northward along the Atlantic coast." This means that most records of Snow Geese from the interior apply to the present race. Even the specimen, upon which Forster based his description of *nivalis*, has been found to be *hyperborea* of the interior (cf. Kennard, Proceedings of the New England Zoological Club, IX, 1927, p. 93). Most of the records mentioned by Preble (see above) very likely apply, therefore, to the present form. He calls attention to Swainson's and Richardson's speaking of its occurrence at Albany and York (1831, p. 467); to Bell's characterizing it as abundant at Churchill and York during migration (1880, p. 69c); to Barnston's reference to its migration along the Albany River (1841, p. 254); and to Rae's taking at Repulse Bay a specimen, which is recorded in the British Museum Catalogue of Birds.

Eifrig (1905, p. 237) says: "This species . . . is rather common on Southampton Island and Baffin Land. Two males were taken June 4 and 7 respectively. On the former date a flock of twenty-two was seen, the first two of which seemed to be Blue Geese (*Chen caerulescens*). Stomach contents: vegetable matter and stones. They breed mostly on islands along the eastern shores of Hudson Bay, and more abundantly to the northward. Their nests are found in wet ground and are made of grass, moss, etc., with down on top, the whole 6-8 inches high. A set of seven eggs was taken on Southampton Island June 22, 1904."

Low (1906, p. 317) under *Branta canadensis hutchinsii*, a typographical error, says of the present form: "Numerous in the spring about Fullerton. Found breeding on Southampton in end of June. Nests in swampy ground, built up of moss and grass. Skins and eggs from Southampton."

Mathiassen apparently did not see the bird at Duke of York Bay during the fall of 1922. Mr. Ford found it abundant in summer and on migration to Coats Island where he did not find the Blue Goose nesting. Soper (1928, pp. 91 and 92, and 1930d, pp. 38-48) found it common on southern Baffin Island, but did not find it interbreeding with the Blue Goose. Mr. Swaffield took a specimen⁹ in the midsummer of 1930 at Mansel Island, where it probably nests (Sutton, 1932a, p. 42). We did not see it along the west coast of Hudson Bay during the late summer of 1930 (1931c, p. 157). Captain Comer took a complete set of five eggs, and an incomplete set of two eggs at Southampton Island, probably in the Cape Low region, on July 14, 1904.

The A. O. U. Check-List (1931, p. 40) gives the known breeding range as follows: "along the Arctic coast from Point Barrow, Alaska, to Southampton Island and southern Baffin Island and on Arctic islands to the north; also occurs in summer on the Chuckches Peninsula, Siberia."

Chen hyperborea atlantica Kennard. GREATER SNOW GOOSE.

Preble (1902, p. 89), believing the Hudson Bay region to be "eastern" rather than "western," and recognizing the Greater Snow Geese as the "eastern" form, assembles all pertinent references to Snow Goose under "*Chen hyperborea nivalis* (Forster)," and adds the following footnote: "In some of the cases cited the species has been recorded as *C. hyperborea*, but I have assumed that the eastern form is referred to." We now know, of course, that Forster's type of *Anser nivalis* was from the southwest coast of Hudson Bay (*Severn River*), and that *Anser nivalis* Forster is therefore a synonym of *Anser hyperboreus* Pallas; that the Greater Snow Goose is a bird of the Atlantic coast; and that the references cited by Preble therefore probably apply, not to the present form, but to *hyperborea*.

⁹The wing of this specimen measured 399 mm.

Mr. Kennard, who has made an exhaustive study of the Snow Geese, has come to the conclusion that *atlantica* is practically never found in Hudson Bay. He says (1927, p. 86): "In all the collections I have examined, both public and private, I never have seen a single specimen from the Gulf coast, the Mississippi Valley, or anywhere in the Middle West, that was referable to the larger form. There is in the collection of the United States National Museum one ancient skin of an immature snow goose, labelled "Hudson Bay," but about which nothing further seems to be known. This bird may have been a straggler, collected somewhere in Hudson Bay, or may have come from Hudson Straits, across which these birds migrate in the spring and fall."

Soper (1928, p. 92) says of the Greater Snow Goose: "It is assumed that the snow goose which nests in northern Baffin island belongs to this subspecies, but so far as known no specimens have been brought from this region." This statement was doubtless accurate at the time of its publication, but there are now several specimens, which Mr. Kennard considers *atlantica*, in the Canadian National Museum, from northeastern Baffin Island (Pond's Inlet) and Navy Board Inlet, Bylot Island. All these are said to have been taken on their breeding grounds. In a letter dated November 16, 1931, Mr. Taverner says: "Whether these individual birds were nesting is not certain, but they are all in wing-moulted flightless condition. In fact I believe the natives drove them into camp before killing them, thus avoiding having to carry them." Mr. Taverner informs me that the Canadian National Museum also has "specimens (with accompanying eggs) from Croker Bay, near Dundas Harbor on south coast of North Devon Island."¹⁰

The American Ornithologists' Union Check-List (1931, p. 41) states that this form is "accidental at Cape Fullerton, Hudson Bay." This statement is apparently based upon a specimen in the collection of Dr. Louis B. Bishop. Mr. Kennard has examined and measured this specimen carefully, and believes it to be *hyperborea*. The measurements (in millimeters) which he took are as follows: Wing: 420; Tarsus: 83; Middle Toe and Claw: 75; Exposed Culmen: 62; Height of Bill: 33; Tail: 120. I have not seen this specimen myself, but rather incline toward the belief that it is *hyperborea*, in spite of the apparent length of the bill.

10. *Chen caerulescens* (Linnæus). BLUE GOOSE.

(Plate XII, fig. 1; Plate XXIV, fig. 2)

Eskimo Name: The Aivilik Eskimos called the Blue Goose the *Khavik*. Certain of the Southampton Island Okomiut also used the word *Khavik*, or a close equivalent, though the name actually in use in Baffin Island, according to Soper (1930d, p. 38) is *Kungovik*. *Khavik* and *Kungovik* are both, at least in part, onomatopoeic words, the first syllable being an imitation of the bird's characteristic warning cry. So far as I could learn, no Eskimo name for the species alludes in any way to its color.

Status: The Blue Goose is locally abundant on Southampton Island in summer. The largest breeding-ground known at present is near Cape Kendall, along the north shore of the Bay of God's Mercy. It also nests here and there, in isolated pairs, throughout the coastal lake-belt of the western part of the Island, but does not, according to our experience and to the reports of the natives, nest in the high country of the eastern part. It is my present opinion that all the Blue Geese which visit Southampton during the course of the year actually nest there; that is, that none of them stop on, or fly over, the Island *en route* to Baffin Island, or other more northerly nesting-grounds. According to Soper (*Ibid.*, pp. 23-25) those which nest on Baffin Island migrate northward probably only along the east coast of Hudson Bay.

The Blue Goose interbreeds to some extent with the Lesser Snow Goose on Southampton

¹⁰In a footnote to Soper's paper (1928, p. 92), there is a reference to these specimens, signed "R. M. A." [Dr. R. M. Anderson].

Island. An exhaustive discussion of this hybridization has already appeared (Sutton, 1931d, pp. 335-365), and further comment is here hardly necessary. Let it suffice to say that although this hybridism is of sufficiently frequent occurrence to be at least partly responsible for what has been called the "white-bellied phase" of the species, it is not wide-spread enough to have caused the merging of the two forms.

Eight specimens of Blue Geese were collected by Tommy Bruce. Measurements of these birds are given here.

Measurements in millimeters of *Chen caerulescens* from Southampton Island.

MALES				
G. M. S. No.	C. M. No.	WING	CULMEN	TARSUS
3720	-----	420	57	80
3731	110,286	426	56	75
3732	110,287	442	58	81
3733	110,288	417	55	80
Average		426.25	56.5	79.
FEMALES				
3734	110,289	423	56	80
3735	110,290	401	53	71
3736	110,291	407	56	74
3737	110,292	389	53	81
Average		405	54.5	76.5

Fall Records: On August 17, 1929, I was shown the well-preserved skin of an adult female Blue Goose, which had been shot early in the preceding July, at Bear Island, by Jack Ford. The specimen was in full, though worn, plumage. There was no bare area on the belly, so I feel sure the bird had not been incubating. The entire belly was dark, much of it having a rusty-brown suffusion. The head and neck were white, the lores and forehead being liberally sprinkled with rusty, and the lower neck somewhat mottled with dark gray. According to the Eskimo woman who skinned the bird, the ovaries were enlarged; but none of the hunters would venture to affirm that the *Khavik* had ever nested on Bear Island. The bird had been seen with another Blue Goose, however, and the Eskimos considered the two a mated pair.

On September 2 near the mouth of the Ranger River I spent much time in searching for a goose-colony, about which I had heard from the Eskimos. I walked over much of the tundra along this river and the lakes nearby, but found no trace of any extensive breeding-ground. Since few birds or eggs had been taken at this place during recent years, I judged that the birds had changed their territory somewhat, due to fouling of the ground, to diminution of the food-supply, or for some other cause.

Though we found no nests or flightless young birds, we saw great flocks of geese, most of them Lesser Snow Geese. Noisy hordes of the large birds circled about restlessly, apparently searching a feeding-ground, and then, after settling comfortably, rose with renewed clamor, as if dissatisfied, or alarmed. Obviously they were migrating. Probably few, if any, of these birds had nested at Cape Low. Among the snowy flocks were many dark-colored birds and a goodly proportion of these were adult Blue Geese, with white heads, but we collected no specimen. Although the two species mingled freely, the Blues kept in small closely knit groups; and they did not always stay with the white geese either in flight or on

their feeding grounds. I venture to guess that fully twenty-five per-cent of these flocks of migrants were Blue Geese, though it was impossible satisfactorily to distinguish the young of the Blue Goose from the young of the Lesser Snow Goose.

The behavior of the two species was amazingly similar. Their call-notes, from the deep *kah, kah, kah* of warning, to the various gabblings and groanings of the feeding flock, or the high-pitched *whah, whah, kah, whah, whah* of the alarmed birds on the wing were, so far as I could determine, identical.

On September 3 many Blue Geese were seen, probably four hundred birds in all, mingling with the hundreds of restless, wary, noisy Snow Geese. All the birds were busy feeding much of the time. They walked slowly about on the moss, nibbling at the grass. Part of the flock sometimes rested. At the merest hint of alarm the nearer birds set up a loud calling, whereupon the entire flock began to gabble noisily and then to walk rapidly away, or to take flight in haste. At about noon, we saw huge flocks of both Lesser Snow and Blue Geese flying southward or southeastward, headed, apparently, not for the nearest point along the western shore of Hudson Bay, but for Coats Island, less than a hundred miles away, where it may be they are accustomed to gathering before going on to James Bay.

Mr. Ford, who lived on Coats Island from 1919 to 1922, and then again during part of the period of 1923-1924, believes that the Blue Goose did not, during his residence there, nest on Coats Island, though he saw them regularly in the fall. "White" geese were, however, frequently seen in summer. Elsewhere in this general region, where the Lesser Snow Goose nests, the Blue Goose is likely also to occur, and I am inclined to believe, therefore, that it may occasionally nest on Coats Island. The migration of Lesser Snow and Blue Geese from Southampton to Coats Island (providing this migration regularly takes place) suggests that these species may have inhabited Coats Island originally and thereafter spread over to Southampton, recapitulating their racial history to an extent by including Coats Island in their migration route. I do not have enough data to warrant any detailed attempt at explanation of the migratory routes taken by these birds. It is, however, highly interesting that they do not make for the western shore of Hudson Bay direct from Cape Low or Cape Kendall, if they are *primarily* interested in reaching a territory, which will furnish them contiguous feeding-grounds as they pass to James Bay. I attempted to learn from the Eskimos more about the autumnal migratory customs of these species, but could not gather much definite information.

I believe that we witnessed on September 3, 1929, the departure of almost the last flocks of Snow and Blue Geese from the Cape Kendall region. Though the weather was not disagreeably chilly, nor had there been any heavy snowfall, yet the grass was brown and winter was obviously at hand. Murie (*cf.* Bent, 1925, p. 183) was told by natives that Blue Geese sometimes arrived from the north in the region of James Bay as early as August. This date of departure, therefore, does not seem in any way unusual. All the young geese were evidently in full plumage, though among other species, such as the Snowy Owl, Black-bellied Plover, and Red-throated and Pacific Loons, half-grown or even only one-third-grown young were noted.

The great flocks were so restless and wary, that it was evident they were eager to be off on the slightest excuse. Whether the Southampton Lesser Snow and Blue Geese regularly go direct to Coats Island, and whether, from Coats, they move westward, or southwestward to the coast of Hudson Bay, or whether indeed, they go eastward or southeastward, perhaps via the Belchers, and eventually on to James Bay, are questions which remain to be answered. At Cape Low, however, I received the definite impression that all the geese on leaving South-

ampton were moving eastward, rather than directly southward, and certainly not westward.

Spring Records: At Coral Inlet the first Blue Goose (one bird only) was noted on June 10 by the native boy Santiana. This bird was flying about with a flock of the small Hutchins's Goose, which had come in from the southeast. On June 13 Muckik saw a large flock passing westward over Bear Island, and Jack Ford saw many small flocks milling about with the larger flocks of Lesser Snow Geese in the partly snowless plains at the foot of Itiujuk. One reason for lack of information as to the direction of flight of the incoming birds is that they sometimes fly very high and are not seen by anyone.

In my own field-work about Coral Inlet and Prairie Point, I kept a constant lookout for Blue Geese, and though I occasionally saw a pair or small flock passing over, I did not locate any nesting birds until the middle of the summer.

On June 25 Jack Ford returned to the Post from a several days' trip to Prairie Point and the southward, bringing with him a set of six eggs, which were according to the natives, who had been with him at the nest, *Khavik* eggs. He had cared for them meticulously, and was delighted that he should be the first to bring in these rare treasures. When I learned, however, that one of the parent birds at this nest had been a 'white' goose, I came to the conclusion that the eggs were not of the Blue Goose at all, but of a rather unusual pair of Lesser Snow Geese. Unfortunately no specimens were collected with this set, but I am now certain that these eggs are hybrid—the female parent being a Blue Goose, the male a Lesser Snow.

On July 9 Tommy Bruce returned to the Post from Cape Kendall, bringing with him eight Blue Goose skins, and nine eggs (three sets of three eggs) most of them slightly damaged. In reaching Cape Kendall he had had difficulties. The whole region was badly flooded, and there were such hordes of lemmings in the dry spots that the children had had to kill these mice before camp could be made. Their *tepiik* was pitched amongst the birds. Tommy estimated that there were between eight hundred and a thousand pairs of geese in the vicinity of his camp. The majority of these were Lesser Snow Geese; but there were fully three-hundred pairs of Blue Geese and a good many scattered pairs of Hutchins's Geese, as well as some Brant. The Lesser Snow and Blue Geese nested side by side everywhere in the vicinity, usually on the higher stretches of land between the shallow lakes. On June 15 nearly all the Blue Goose nests held from one to three eggs, but they were so sparsely lined with down that Tommy could not find one which he considered representative, so did not collect any. Several sets with a runt egg were found, and one of these sets was collected. Tommy told me that he had seen nests of the Blue Goose containing five and six eggs during previous years, but that he did not find any during 1930.

Among the possibly one thousand pairs of geese observed about his camp near Cape Kendall Tommy Bruce estimated that there were twenty pairs, which represented definite interbreeding of the two species, where one parent was distinctly white, the other distinctly 'blue.' There were also several pairs of Blue Geese where one of the birds had considerable white blotching on the upper part of the breast, or where the whole region of the belly, rump, and even of the back was white. These white-bellied birds were fairly common, and one such specimen was included among the eight skins brought back from the colony.

Tommy should have used salt in preserving the skins; but the salt had been lost, I believe, in crossing a river. The specimens had been neatly skinned and stuffed with grass without any preservative whatever, and, since the *tepiik* had frequently been damp, and the weather at times warm, the skins were tainted. They had been carefully sewn up, their feet neatly crossed and tied, and strangely illegible, square, paper labels actually attached. The eggs,

contrary to my advice, had been crudely blown. Nails had been used as drills and straws as blow-pipes.

On June 20 some of the Okomiut men also visited the Cape Kendall colony and gathered numbers of goose-eggs. They also found the Blue Goose about half as common as the Lesser Snow, and noted that in their nests there were usually fewer eggs than in those of the Snow Goose. Many of these eggs were brought to the Post loosely packed. It was painful to gaze upon these piles of cracked eggs, composed of hopelessly mixed up sets.

There is no way of precisely locating the Cape Kendall colony, since it extends for miles along the north shore of the Bay of God's Mercy. The natives said they couldn't visit all the nests, because they got "tired of wading through the lakes." It is interesting to note that, according to Tommy Bruce, there were no Whistling Swans or Little Brown Cranes in the entire region occupied by the geese.

It is also interesting to note that Lyon (1825), Comer, who journeyed about in the region from 1896 to 1920, and Low (1906) do not mention the Blue Goose in their writings, though all three of these men were to some extent acquainted with the Cape Kendall region. Low includes the Lesser Snow Goose in his list (p. 317) but neither Lyon nor Comer makes any special mention of this conspicuous species.

On July 12 I saw two Blue Geese, which I thought were a mated pair, flying near the Post eastward toward the head of Coral Inlet. I decided at the time to make a special attempt to cover the region toward which the birds seemed to be flying. Two days later, I walked about eight miles from the Post, and reached an interesting region where several Hutchins's Geese, a pair of Brant, and a pair of Blue Geese were nesting. There were also two other geese, a Lesser Snow and a Blue, which were apparently mated, but whose nest was not found.

The Blue Goose nest contained four eggs, which I collected, for I feared I should not be successful in returning to procure the downy young. The nest was built of rather fine grass, lined with down and feathers, and placed among grasses and low willows not far from the edge of a lake, about four miles inland from salt-water. The female, which was somewhat blotched with white below, left the nest, while I was yet some distance away, and joined her mate, a normally colored bird, at the edge of the lake whence they both flew off, yapping and cackling noisily. They were very shy and I could not get anywhere near them. I waited for some time for them to return, but they always flew high above me in swinging over the nest, and I did not have an opportunity for a shot. The eggs, which were heavily incubated in consequence of the lateness of the season, were difficult to prepare. I think the birds must have been delayed in their nesting. The set may even have been a second one for the season. The nesting birds at Prairie Point were so frequently disturbed by the Eskimos, that it seems likely certain pairs may have been driven from their chosen nesting-ground and eventually built a delayed nest on the opposite side of the Inlet.

Two Blue Goose nests found in the Prairie Point region by the natives were not preserved. These nests both held four eggs. No downy young birds were collected.

Most of the nests found by Tommy Bruce at Cape Kendall contained three eggs. The nest I found at South Bay held four eggs. As noted before, however, larger sets have been seen by the Eskimos, and family-groups with four and five young were noted at Cape Low. As regards the number of eggs in the set Soper says: "Of the eleven sets of Blue Goose eggs collected, four consist of four eggs, three of three eggs, and four of two eggs each, making an average, therefore, of three eggs to the set."

Annual Routine: The Blue Goose returns from the south early in June, at the same time as the Lesser Snow Goose. Some of the birds appear to be mated at the time of their arrival;

others are in flocks, whether mated or not. At least some of the birds reach Southampton from the east or southeast, apparently by way of Coats Island. Others may come in from the west, or southwest, or even directly from the south.

Most of the birds make their way rapidly to the favorite nesting-ground at Cape Kendall, where among the grass-lined lakes nesting-sites are promptly chosen. Nests are placed in the open, usually well separated, as described by Soper (1930d, p. 54), on the driest ground available, and not often far from a lake. When the first egg is laid there is little down in the nest, but as the set increases, more down is added. The female incubates; the male usually stands on guard not far away. I have no definite data on the period of incubation or of the care of the young.

The enemies of the Blue Goose are the same as those of the other geese. Jaegers, gulls, ravens, and Arctic Foxes take a good many eggs and doubtless occasionally capture the young birds. The Snowy Owl and Weasel may occasionally capture young birds. The adult geese are so wary and so keen-eyed, that they probably are only rarely caught by such predators as the fox or wolf, and they are too heavy to be killed very often by gyrfalcons, or even Snowy Owls. The Eskimos take a great many eggs during some seasons and sometimes kill the adult birds with their rifles and shot-guns. I was surprised to learn, however, that, probably due to the difficulty of reaching the nesting colony in mid-summer, the Eskimos almost never attempt to capture birds during their flightless period.

During the summer the adults undergo a complete post-nuptial moult. At this time, according to Amaulik Audlanat, they move inland, sometimes quite a distance, remaining together in family-groups. As autumn approaches, they come together in larger bands near the coast. They prepare to leave for the south in late August or early September. In leaving Southampton they frequently, perhaps customarily, fly to the south or southeast, apparently for Coats Island, where they may stop at a favorite feeding-ground en route to James Bay, where they are known to congregate in great numbers before passing on to the south. During their entire summer existence they are closely associated with the Lesser Snow Goose. They arrive with that species in the spring and depart with it in the fall, sharing the same food, shunning the same enemies, and responding to the same stimuli of one sort or another in a remarkably similar manner.

Fleshy Parts: The specimens which Tommy Bruce brought back from Cape Kendall were so dry that I could not make any accurate notes upon the color of the fleshy parts. Soper (*Ibid.*, p. 20) has, however, given us an excellent description of these parts.

Other Records: It was upon Edwards' (1750, pl. 152) plate of the "Blue-winged Goose" that Linnæus based his description of the present species. A specimen from Repulse Bay, perhaps collected by Rae, is recorded in the British Museum Catalogue of Birds. Preble (1902, p. 89) does not give us any further records from the Southampton region, and Eifrig (1905, p. 237) mentions the species only in connection with the Lesser Snow Goose. He says: "On the former date [June 4] a flock of twenty-two was seen, the first two of which seemed to be Blue Geese. . . ." Low (1906, p. 317) does not mention it. Mathiassen apparently did not see it in the Duke of York Bay region in the fall of 1922. Mr. Ford noted it on both Southampton and Coats Islands, but believes that it nests only on the former. Soper (1930d, pp. 1-64) gives us an exhaustive account of the bird on its nesting-grounds on Baffin Island, where he did not find it inter-breeding with the Lesser Snow Goose. The American Ornithologists' Union Check-List (1931, p. 41) gives the breeding range as "south-eastern Baffin Island and Southampton Island." Mr. Swaffield did not take a specimen on Mansel Island during 1929-30 (Sutton, 1932a, p. 42); so the species probably does not regu-

larly stop during migration, or nest there. We did not record it along the west coast of Hudson Bay during the late summer and fall of 1930 (Sutton, 1931c, p. 157).

SUBFAMILY ANATINÆ.

Genus *DAFILA* Stephens.

Dafila acuta tzitzihoa (Vieillot). AMERICAN PINTAIL.

This species probably occurs rarely at Southampton in summer, and it may occasionally breed there. Its presence here, as in the case of the Honker, *Branta canadensis canadensis* Linnæus, is probably traceable to storms, which blow it across Sir Thomas Roe's Welcome from the mainland, where it is known to be fairly common in summer.

Jack Ford, Amaulik Audlanat, and myself saw during both summer and fall, at Prairie Point and elsewhere, some medium-sized, rapidly-flying ducks, which "towered" from the pools in the manner of Pintails; but we never got a specimen, so there remains some uncertainty as to the identification of these birds.

At Chesterfield, during the late summer of 1930, Pintails were seen daily, sometimes in large flocks; and from reports given us at various points, it is a common bird along the entire western coast of the Bay, being known among the Eskimos as the *Kashluak* or Long-neck (Sutton, 1931c, p. 156).

Preble (1902, p. 84) says: "Hundreds were seen on the shallow ponds of the Barren Grounds, 50 miles below Cape Eskimo, August 4 to 8; and on our way back to Fort Churchill, August 13 to 19, numbers were seen wherever we landed."

Genus *NETTION* Kaup.

Nettion carolinense (Gmelin). GREEN-WINGED TEAL.

According to the British Museum Catalogue of Birds, Rae collected a specimen of this species at Repulse Bay. I am inclined to think that this specimen was collected considerably farther to the south.

The nearest point at which I am reasonably certain the species has been taken is Nunalla, along the west coast of Hudson Bay north of Churchill (Sutton, 1931c, p. 156).

Genus *QUERQUEDULA* Stephens.

Querquedula discors (Linnæus). BLUE-WINGED TEAL.

A specimen, said to have been collected by Rae at Repulse Bay, is recorded in the British Museum Catalogue of Birds. I think this bird must have been collected farther to the south. I cannot find any other records for the species in the Hudson Bay region, nor does Preble (1902, p. 84) mention any.

SUBFAMILY NYROCINÆ.

Genus *NYROCA* Fleming.

11. *Nyroca marila* (Linnæus). GREATER SCAUP DUCK.

Eskimo Name: The Eskimos were much interested in the single specimen of this species which I collected, for only one of them had seen the bird before; this was old Angoti-Marik (Scotch Tom), who had seen it in the Repulse Bay country and who said that it was something like the *Kashluak* (meaning 'long-neck') or Pintail (see Sutton, 1931c, p. 156) which is fairly common about Chesterfield and which evidently ranges even farther northward than that point. Muckik, upon examining the scap closely, pronounced it a *Nugluk*. He had never seen the species before, however, and I think his *Nugluk* was merely a slight perversion of *Nekilik*, the name which is so widely applied to all the geese of the genus

Branta. Mr. Brandt tells me that in Alaska he heard the word *Koop-pal-luck* applied to the species.

Status: An accidental migrant, recorded once from the Island, during the period of the fall migration. It may nest rarely in the western part.

Record: On October 14, 1929, I collected an adult female from a narrow pool in a large, partly frozen-over lake about a mile inland from Seal Point. In the same pool was a crippled female Old-squaw. The scap was not wild; it rose rather heavily in taking flight. At a distance its head appeared larger and its neck longer than in any species of duck customarily found in the region. I think it likely that the bird had been blown to Southampton during the heavy gale from the south and west on October 2 and 3. The specimen, which was in good condition, was not fat. The stomach contained chiefly gravel. Weight: 2 lb. 5 oz.

Fleshy Parts: The bill and feet were dull bluish gray, brightest on the broad part of the upper mandible. The eyes were dull greenish yellow, grayish just about the pupil and shading through dull brown before becoming yellow at the outer edge.

Other Records: Bent (1923, p. 217) states that this species breeds northward "to the Arctic coasts of Alaska and Canada." The A. O. U. Check-List (1931, p. 51) states that it breeds "on the Arctic coasts of Europe and Asia from the Aleutian Islands and the Arctic coast of Alaska and Canada to the west coast of Hudson Bay. . ." The nearest point at which it has actually been taken appears to be "between Fort Churchill and Cape Churchill" (Preble, 1902, p. 85). Neither Eifrig (1905, p. 236), Low (1906, p. 316), nor Soper (1928, p. 87) even mentions the species.

Genus *CLANGULA* Leach

12. *Clangula hyemalis* (Linnæus). OLD-SQUAW.

(Plate XIII, fig. 1)

Eskimo Name: The name for this species which I heard most frequently among the Southampton Eskimos was *Uhgik*. At Chesterfield, and also occasionally at Southampton, the name *Ahng-ahngok* was used. These words are both imitations of the courting cry of the male; the latter, when given with the proper inflection, has much the throaty quality of the duck's voice. Mr. Brandt tells me that among the Alaskan Eskimos, the Old-squaw is called the *A-hung-ee-yak*. According to Hantzsch (1928, p. 202) the name in use in north-eastern Labrador is *Aggek* or *Angek*.

Status: The Old-squaw is one of the most abundant summer resident birds of Southampton. It is comparatively uncommon in the eastern part where the land rises abruptly from the sea, but elsewhere it is common among the coastal lakes, on the off-shore islands, and even along the grassless limestone beaches. As a fall migrant it is sometimes amazingly abundant. The late summer and early autumn flocks, which I saw in the vicinity of Leyson Point, were I believe the largest flocks of birds I ever saw anywhere. These flocks may have been composed only of birds which had nested on the Island, together with their progeny; I think it more likely, however, that they had assembled from Melville Peninsula and other regions nearby in this favorite feeding- or moulting-ground in Evans Inlet.

We did not see any Old-squaws about Southampton during the winter; nor did the Eskimos tell me that they had ever seen it there during the coldest months. It is said to winter in this latitude occasionally, however, in the open water (Low, 1906, p. 316).

It arrives in the spring a little later than the eiders, and disappears in the fall somewhat earlier than they.

Fall Records: On August 18, 1929, I saw a mother and eight young in one of the small lakes near the Post. On the following day, twenty females, with broods ranging from five to thirteen young, were seen in lakes along the coast. No males were seen anywhere. The mother birds sometimes flew or swam about anxiously, quacking loudly. As a rule they kept their broods out toward the centre of the lakes, however, and had no occasion for showing great alarm. The young dived well. Most of them appeared to be a few weeks old, some being about three-fourths as large as the mothers. On August 21, the Eskimos brought in two downy young, which they had caught in the lakes. One of these was about a week old, a mere baby; the other was about half-grown.

On August 22 a loose "raft" of young were seen in a large lake. These birds, perhaps a hundred of them, appeared to be without a guardian of any sort. On August 25 many broods of young were seen at Prairie Point. All of these broods were attended by their mothers. In South Bay we saw also a flock of ten dull-colored birds, which were either non-breeding females, or mother birds, which had lost or deserted their young, or else juvenal birds, which were making their way out to the autumnal feeding-grounds in Fisher Strait.

On August 26 I spent considerable time watching a mother and her five small young near the Post. The mother quacked softly, as she led her charge to the middle of the pond. They dived with great ease, but could not long stay under, and came bobbing up all over the pond.

On August 31 many broods of young, all attended by their mothers, were seen in the sheltered coves of a large lake near Hut Cove, where a colony of Herring Gulls lived. As I walked round the lake, the ducks all made off with a rush, leaving deep furrows in the water behind them, or diving like a flash, bobbed up in a bewildered manner. They appeared to use their wings under the water, at least part of the time. On this date Amaulik caught one nearly full-grown young, which had apparently been wounded by a gull or jaeger. We kept this bird alive for a day and a night. It ran about among the stones on the "floor" of the tent, and "sat down" with comical abruptness whenever it became tired. When I stroked its head it nibbled hastily at my fingers. In the morning it awakened me by scrambling over my face.

From September 1 to 3 many fair-sized flocks of dark-colored birds without elongated rectrices were noted in the vicinity of Cape Low, especially at the mouth of the Ranger River, where they fed, or rested along the shore. All of them could fly perfectly, so far as I could see, yet I think most of them were males in the moult. Altogether probably eight hundred of these birds were seen; but unfortunately no male specimen was taken. In female specimens taken at about this time, the wing-feathers appeared to be *new*, but the body plumage appeared to be moulting.

On September 6 four females were seen on an inland lake at Four Rivers, and one was taken. In this specimen the post-nuptial moult of the wing-feathers had been completed, but the worn summer-plumage of the head had not been replaced by that of winter. The bird could fly perfectly. From September 9 to 17 a few were seen each day, either on the lakes, or at sea; though at the Post they were much less common than they had been a month earlier. On September 17, a large flock were seen just west of Seal Point.

On September 18 many flocks of male birds were noted at Bear Island and Native Point. None of these birds, so far as I could see, had a long tail. On the same date a flightless female was taken on a little pond at Native Point. In this specimen the remiges lacked an inch of being full length, but the moult of the head and body-plumage apparently had not yet begun. The individual was rather thin.

On September 19 along the southern coast from Native Point eastward, we saw large flocks of both male and female birds, all perfectly able to fly. In the vicinity of Kikkuk-towiyak Island and at the mouth of Lake Brook the flocks were sometimes so dense, that they had the appearance of dark, wind-torn vapors, which actually obliterated the horizon, sometimes for a considerable distance. All these birds were moulting, and they were very wild. I watched closely for long-tailed birds and saw several. I also noted some which appeared to have some white of the winter plumage on the head and back.¹¹ On the surface of the water shed feathers were to be seen everywhere. On the following day thousands of birds were seen at Leyson Point and at the mouth of the Anderson River about ten miles out from shore. They were all very wild. As a rule they flew up half a mile ahead of our motor-boat and sped rapidly westward not coming anywhere near us. On September 21 tremendous flocks continued to appear ahead of us, as we made our way eastward. By the time we were within fifteen miles of Seahorse Point the birds gradually became rarer, however, until at Seahorse proper practically none was to be seen. An adult female in nearly complete winter plumage was taken from a small flock, which whirled by the boat.

On September 22 four youngish birds were seen swimming not far from our anchored boat. These were the only Old-squaws recorded at Seahorse. On the return trip to the Post, we began to see *Uhvik* again fifteen miles west of Seahorse. Again the greatest flocks were seen at Leyson Point and at the mouth of the Anderson River, where on September 25 and 26 huge masses of the birds were observed.

On September 27 great flocks were seen between Anderson River and Native Point, and five specimens, two adult males, a young male, and two adult females were collected. The adult males were very fat, and both had new central tail-feathers of almost full length, as well as extensive patches of *new* winter-plumage on the head and upper neck; both had new wing-feathers; and in both the plumage of the back and scapulars, which was being replaced, was apparently that of the courting spring male.

On September 28 many large flocks were seen in South Bay and even in the Inlet not more than two miles from the Post. On October 1 the remains of a young bird were found along the shore of one of the lakes. On October 2, a solitary adult female was seen at Seal Point. In the bay off from the Post were several large flocks, among which were some males with long tails. On October 4 Jack Ford saw a small flock flying inland, and succeeded in shooting three, all of which proved to be young, one a male and two females. All were fat, the male weighing 2 lb. 3 oz., and the females 1 lb. 8 oz. and 1 lb. 9 oz., respectively. All were in good plumage, not apparently in any sort of moult, though there were a few pin-feathers in the head and neck. The male was colored almost exactly like the females, but he was noticeably larger.

On October 12 a solitary bird, which I took to be a female, was seen not far from the Post, flying swiftly about some of the off-shore islets. On the following day a flock of five were seen in the bay about half a mile from the Post. On October 14, the last date upon which this species was recorded during the fall of 1929, two were seen: a male far out beyond Seal Point; and a female, which was collected on a partly frozen inland lake. The latter bird, while apparently in good condition, was in reality a cripple. The tail-bone had been injured badly, perhaps by a jaeger or gull. The bird weighed 1 lb. 4 oz.

The most surprising feature of my field-work with this species during the fall of 1929 was that I did not once note male birds in what I should call a 'special' eclipse-plumage; nor

¹¹It is not known whether these white feathers were of the incoming or of the disappearing winter-plumage.

did I see many which were unable to fly as a result of the moulting of the wing-feathers.¹² *Winter Records:* None of the Eskimos with whom I talked were accustomed to seeing the *Uhgik* anywhere about Southampton in winter. Low's comment (*ref. cit.*) on the wintering of the species near Cape Fullerton leads us to suspect, however, that it is occasionally to be seen in any of the open water of this latitude at this time of the year.

Spring Records: During the spring of 1930, the first *Uhgik* were reported from the region of Munnimunek Point by Father Thibert, who saw flocks of *male* birds on May 16 and 17. On May 25, Kooshoook and other Aivilik hunters saw several flocks at Native Point and along the floe south of Bear Island. On May 26, Amaulik Audlanat and I saw many large flocks, composed of both male and female birds all along the floe near Native Point. They were all very noisy, gabbling and chuckling, as they swam about or flew along the dark water-lanes. Though considerable courting was going on, not many of the birds appeared to be distinctly paired. I shot a male and female, both with enlarged gonads, neither fat.

On May 27 it was noted that, as long as the wind blew from the south or southwest, many Old-squaws were to be seen along the *sheenah*; but that when the wind changed, even though there was much open water, all the birds immediately disappeared. All these migrating water-fowl appear to dread being caught by the closing in of the ice.

The species was not recorded inland until June 13, on which date several pairs and a flock of eight were noted and a male and female collected. Once the species made its way in to the thawing lakes, the tundra began to ring and echo with the incessant *Ah, ah, ahng-owi* of the males. By the time the snow had disappeared, the birds became even more abundant, until flocks or pairs were to be seen in every pool.

The courtship antics of the Old-squaw were very amusing. The males were violently attentive to the females, swimming about close to them all the time and chasing them everywhere. They bowed, pointed their bills into the air, and laid their heads backward over their shoulders and backs, as they gave their amorous call-notes. Sometimes the females too bowed a little. Noticeable wiggling of the long tail-feathers accompanied many of these antics, and sometimes the tail was lifted so high in air that it pointed almost straight up.

On June 16 two males and a female were collected not far from the Post. The gonads of all were much enlarged. On the same date I found the shell of a freshly laid egg, which evidently had been broken open by a jaeger or a gull. On June 17 Santiana found a nest containing two eggs at Seal Point.

On June 18 at Itiuachuk I watched the birds mating. The males flew after the females everywhere, sometimes swooping with terrific speed at them, then shooting into the air to a height of a hundred feet to fall backward giddily, almost "looping the loop," and coasting to one side before resuming the pursuit. Usually these long chases, in which as many as three or four males joined in pursuit of one female, ended in the water. The females often seemed to be genuinely terrified, crying out hoarsely in objection to the violent attacks, and evidently doing their best to find a refuge somewhere. Sometimes all the birds flew higher and higher into the air until they were almost out of sight; then with a rush they returned on set wings, swinging from side to side with breath-taking speed, to plunge straight into the water, their wings open and even beating as they disappeared under the surface.

On June 19 I watched a female steal slyly up the outer limestone beach to a partly finished nest in a little clump of dead grass not more than thirty feet from the edge of the

¹²A special paper has been prepared upon the moult in this species. It is my opinion that many misconceptions exist as to the so-called eclipse- and winter-plumages of the Old-squaw.

frozen bay. She pulled dead grasses into place about her, and worked at the plumage of her belly, apparently pulling out some of the dark-colored down. By evening the nest held one egg.

On June 22 three eggs were found in a nest on a small island in a large, shallow lake. Here lived also a small colony of Arctic Terns. The female Old-squaw defecated on the eggs, eider-wise, as she flew from the nest, which was situated in a little clump of grass about five feet from the water's edge.

On the following day, at the mouth of the small stream west of the Post, large flocks composed exclusively of males were seen. I collected one specimen and found it to be very much bedraggled in appearance and without the long rectrices. I think these birds had finished with their courtship and mating. They seemed to spend most of their time swimming idly about, feeding in the morning and evening, and resting sometimes on the ice during the middle of the day.

On June 25 I found a nest with four eggs under a clump of low willows, about three miles inland at the edge of a large lake. The female flushed noisily, but did not soil the eggs. There was much down in the nest. Male birds noted in the lakes nearby appeared to be short-tailed.

On June 28 I collected a male in "winter" plumage. The white of the throat was considerably mottled with brown, but the top of the head, the upper neck, and the scapular region were largely white. The plumage in general was much worn and faded. On the same date a nest with six eggs was found on a small island in a large lake. On June 29 a few mated pairs were noted at Seal Point. The males appeared to be asleep, with their heads tucked under their shoulders; but the females were very much on the alert. All these male birds had long tails.

On June 30 Keetlapik found many nests with incomplete sets of eggs on the Tern Islands. On July 1 I found two empty nests on one of the flat islands just off Seal Point, and shot a male in full summer-plumage. The stomach of this individual was well filled with remains of small snail-shells. At this season there was still a good deal of courtship activity among some of the birds near the Post. I think this delayed activity was due to the robbing of nests by the Eskimos.

On July 3 an adult female was taken, the plumage of which was much worn and faded, and the scapular region of a decided gray or blue-gray color, the feathers having a somewhat fresher appearance, as if some sort of moult were taking place.

On July 5 a nest with seven eggs was found at the base of a great boulder, not far from the edge of a small lake, on a rather high ridge not far from the Post. The female flew off noisily, fluttered to the pool nearby, and swam about with tail excitedly wiggling, quacking loudly. On the same date a set of six eggs were collected, from the nest discovered on June 25. I had a good deal of trouble in relocating this nest, because of the growth of the willow-bushes. The incubating female was motionless, and I was actually able to touch her on the bill before she flew off.

On July 6 peculiar courtship antics were observed, in which both males and females flew slowly not far above the water, trailing the rear part of their bodies and sticking their heads far out in front just before alighting with a splash.

On July 11 upon visiting the nest found near the Post on July 5, I found only six eggs in the nest. I wrote on the others, hoping that the Eskimos would realize I did not want the nest disturbed. On July 14 a nest with seven eggs was found on a small, grassy island in a little lake at the head of South Bay. On the same island several pairs of Arctic Terns and a

pair of Pacific Loons were nesting. The Old-squaw eggs were completely covered with a thick blanket of blackish down.

On July 18 the first young birds of the season were noted, a brood of six newly hatched. On the following day a nest with six heavily incubated eggs was found in the middle of the tundra, at least half a mile from the nearest lake. On this date another egg mysteriously disappeared from the nest found on July 5. The Eskimos reported several broods of small young in the vicinity of the Post.

On July 21 in a small deep lake near Seal Point I encountered six broods of young, all accompanied by their mothers. Five specimens, all from different broods, were caught. All but one of these appeared to me to be about two or three days old; one, however, was newly hatched. Only one of the female birds gave herself over to any broken-wing demonstrations. The others, taking advantage of the commotion which held my interest and at the same time attracted a pair of hungry Parasitic Jaegers, swam off to secluded parts of the lake. Later I saw one of the jaegers pursue and capture one of the young.

On July 24 I asked some of the Eskimos to help me in a sort of survey of the country about the Post. We located thirty-seven broods of Old-squaws without much trouble. Most of these were of six young; three were of five, two of four, and one of one. No brood had over six young. Father Fafard saw three adults diving, and he observed that they used their wings, much as in flight, under water.

On July 24 I spent some time in photographing five newly hatched young in the nest, and in a pool nearby found a female with eight young, the largest brood thus far seen. These birds were swimming in such shallow water that I could observe all their movements. The female was frantic over my presence, and dashed about wildly whenever I took a step toward her young. She swam low in the water, dived with incredible speed, and flashed about under the water like a green bottle, swimming much of the time on her side, and sometimes actually turning upside down. When returning to the surface she often shot up clear of the water. The young dived also, but could not stay under very long; they followed their mother single file, wherever she went.

On July 26 a female bird with young was accidentally shot by one of the natives, and the bereft brood promptly swam across the lake and joined a new mother and her brood of five.

During the rest of my stay I saw Old-squaws nearly every day, usually females and young. On August 2 I noted two females in the post-nuptial moult, which could not fly. On August 4 a fair-sized flock of short-tailed males were seen near the mouth of the Kirchhoffer River; and on August 5 a female and eight almost fully-grown young were seen.

Annual Routine: The male Old-squaws frequently arrive somewhat in advance of the females in the spring. However, flocks composed of males and females are to be found along the floe from about the middle of May on. Courtship is noisy and incessant, not only on the actual nesting-grounds, but in the open sea.

When the lakes begin to thaw and the rivers to dig chasms in the salt-water ice, the birds move inland. Long before the ice has disappeared from the bays and coves the eggs are laid. Nests are situated on the ground almost anywhere; principally on little grassy islands in the larger coastal lakes; on small off-shore islets in the salt-water; along the shores of sheltered coves usually not far from the edge of the water, and sheltered by grass; and inland among the willow-growth, sometimes at considerable distance from the water. The nest depressions are lined with a few blades of grass, heaps of willow-leaves, and down. Mr. Ford told me that he had seen a nest with thirteen eggs, but broods I observed were never composed of more than eight young.

Full sets of fresh eggs were first recorded on June 26. Newly hatched young were first seen on July 18. The hatching of broods is sometimes delayed owing to the egg-gathering of the Eskimos. If an incomplete set is taken, the female usually builds a new nest in haste, and proceeds to lay a full set; if the full set has been incubated for a time, and then is destroyed, the female only rarely tries to lay another set, but flies out to the salt-water to join the flocks of moulting males.

The young make their way to water as soon as they can. They are guarded carefully by the females. Unlike the young eiders, they do not appear to want to get to the salt-water as soon as they can. Sometimes they gather in great rafts in the larger lakes. At about this time the females in the inner lakes and the males in the bays are losing their wing-feathers. There is a great deal of individual variation in the moulting of this species.

So far as I observed, the male Old-squaw has no special "eclipse-plumage." Most of the males mate in their bright winter-plumage. By the time they have reached their actual nesting-grounds they have taken on part, perhaps most of the duller summer-plumage, which, to my way of thinking, when finally complete, is the eclipse-plumage. The principal difficulty in describing this plumage centers in the great variation in the manner of moulting in different individuals. Some males retain much of the old, white, winter-plumage throughout most of the summer; naturally when these old feathers drop out, they are replaced by new summer feathers, which appear darker or of different color than the summer feathers which came in earlier in the season. This irregularity in the coming in of the summer feathers has, I believe, given rise to the belief that the male has a "unique special-eclipse" plumage.

As the autumn advances, all the birds make their way to favorite congregating grounds, where they await the coming of cold weather. They move to more favorable latitudes in mid-October. By this time, most of them have acquired their new winter, courting plumage.

The most serious enemy of the Old-squaw at Southampton is probably the Eskimo. The natives do not kill many birds for food, but they gather eggs extensively, and since the nests are easy to find, many are thus destroyed. The Arctic Fox also eats many eggs, and the predatory birds doubtless capture many birds, both young and old. During late summer the Eskimo boys chase down a great many young for sport.

Fleshy Parts: The bill and feet of the downy young are blackish gray. As the bird becomes older, these parts become blue-gray. The eyes of young birds are dark brown, which becomes gradually lighter with the passing of a few weeks. It is possible to distinguish young from adult females by this one character.

The bill of the adult male, in courting dress, is light, pinkish flesh color, with the nail and a broad area at the base dull greenish or bluish gray. The eyes are light, clear hazel, sometimes almost orange in their brightness, and the eyelids blue-gray. The bill of the adult female is dull blue-gray or green-gray, and the eyes, though also light hazel, are not so bright as in the male.

Other Records: The earliest reference to this species I can find in literature applying directly to Southampton, is in the narrative of Captain George Francis Lyon. In his journal (1825, p. 95), under date of September 12, 1824, he tells us that the men who went ashore at Harding Point killed "fourteen eider and pintail ducks in a moulting state." These pintails were, of course, the present species. Hall (1865) under date of June 25, 1865, says that "Ou-e-la [an Eskimo] brought in several pin-tail ducks, with their eggs which were of a greenish cast, but smaller than those of the Eider." This occurred on an island across Frozen Strait from Cape Frigid. Richardson (1825, p. 373) describes specimens taken at Winter Island, Melville Peninsula, on Parry's second voyage. A specimen taken by Rae at

Repulse Bay is recorded in the British Museum Catalogue of Birds. Preble (1902, p. 86) did not encounter it at Cape Eskimo, but says: "Though not observed by us, this species has been recorded from a number of localities on the west shore of Hudson Bay." Eifrig (1905, pp. 236-7) says: "Three skins taken June 16 (male and female) and June 22 (male) at Cape Fullerton. These were very dark, upper parts and breast nearly all black; some rusty brown on back, neck, and scapulars. They were very abundant and noisy at Fullerton and Southampton. They nested around ponds; the nests are made of grasses, lined with feathers. One set of 7 eggs was taken June 30, 1904. . . . Another set of 8 eggs was taken June 27 . . . also at Fullerton. . . ." Low (1906, p. 316) says: "Very common in the northern parts of Hudson Bay and on the Arctic islands. Breeds on the islands in the ponds. Remains in the open water of Hudson Bay throughout the winter. Numbers killed at that season at Fullerton. Skins and eggs from Fullerton and Southampton."

Mathiassen (1931, p. 28) says: "On September 8th we saw at Cape Munn large flocks of long-tailed ducks making southwards." He does not speak of seeing it at Duke of York Bay. Mr. Ford and Mr. Copland found it abundant at the time the Hudson's Bay Company Post was established in 1924, and Mr. Ford found it common in summer on Coats Island. Bent (1925, p. 49), under *breeding range*, states that this species occurs "on Southampton Island and other lands north of Hudson Bay. . . ." He does not definitely include Hudson Bay in the winter range, but states that it may occur "north, when open water is found, to the Gulf of Saint Lawrence and sometimes southern Greenland." Taverner (1926, p. 96) does not mention its wintering in Hudson Bay. Soper (1928, pp. 87-88) gives us several records for Baffin Island, but does not discuss its winter status there. Mr. Swaffield collected specimens on Mansel Island during the fall of 1929 (Sutton, 1932a, p. 42). We found it a common bird in the Chesterfield Inlet region during the late summer and fall of 1930 (1931c, p. 156). Captain Comer took a set of eggs on Southampton Island on July 12, 1904.

Genus *HISTRIONICUS* Lesson.

Histrionicus histrionicus histrionicus (Linnæus). EASTERN HARLEQUIN DUCK.

On the afternoon of May 8, 1930, a flock of small, short-tailed ducks were seen at the edge of the floe about ten miles west of Native Point. They flew very rapidly, keeping close to the water. I could see with my binocular that some of them had white markings in the plumage—though not particularly so on the wings—and that they certainly were not either male or female Old-squaws, which customarily appear along this part of the floe a little later in the season. They appeared exceedingly small as compared with the ponderous King Eiders which flew about nearby. There is a strong possibility that these little ducks were of the present species.

Preble (1902, p. 86) mentions three records for the species from more southern parts of Hudson Bay. Bent (1925, pp. 57 and 61-62) does not include Hudson Bay in the range either of the present race, or of *H. h. pacificus* Brooks, the Pacific Harlequin Duck. Soper (1928, p. 88) tells us of the capture of "an adult female and six juveniles" on August 26, 1924, near Blacklead Island, along the southern shore of Cumberland Sound, Baffin Island; and the Check-List of North American Birds (A. O. U. Committee, 1931, p. 55) includes "southern Baffin Island" in the breeding range, probably on the strength of Soper's record.

GENUS *SOMATERIA* Leach.13. *Somateria mollissima borealis* (Brehm). NORTHERN EIDER.

(Plate XII, fig. 4).

Eskimo Name: The Aivilikmiut gave this eider several names. Adult males in breeding dress they called *Amalee*, *Amaulik*, or *Amaulikak*. According to Jack Ford, all these words refer in some way to the black crown or hood, or to the white 'cape' of the back. The Snow Bunting is sometimes called *Amaulikak* also, presumably because of its white head or black mantle; and the word *amaulik* is exactly the same as that used for the dorsal fin of a fish. Still another word is applied to the male at the time of mating; this is *Angotiviak*, or a near equivalent. This word may be applied to any male bird, or in fact to any male animal, but it seems to be in use chiefly with the present species. *Angotiviak* is suggestive of the word *Ang-ik-fuhk*, which Mr. Brandt tells me is used in Alaska.

Another word, *Mittivik*, is applied to both male and female birds. The similarity of this word to that applied to the King Eider, *Mittek*, is marked. *Mittek* is sometimes used in reference to eiders in general.

Status: According to Bent (1925, pp. 93-4) the Northern Eider intergrades with the American Eider "in the regions north of Hudson Bay" and at Baffin Island, Ungava Bay, Southampton Island, and Cape Fullerton. Low (1906, p. 317) does not state that the two species intermingle, but notes that "a number [of Northern Eiders were] shot along with the American Eider in the neighborhood of Fullerton." Eifrig (1905, p. 237) does not speak of any intermingling of the two races and does not, in fact, even mention the American Eider. Soper (1928, pp. 89-90), similarly, mentions only the present race in his paper on Baffin Island, leaving us under the impression that he encountered no American Eiders while there.

The eiders I took at Southampton Island during the spring and summer of 1930 do not show any intermingling of the two forms, the lateral frontal processes of the bills being narrow as in typical *borealis*. A specimen taken at Mansel Island by Mr. Swaffield, however, is apparently somewhat intermediate, these processes being a little too broad for *borealis*, but on the other hand decidedly too narrow for *dresseri* (Sutton, 1932a, p. 42).

The Northern Eider is not strictly a permanent resident at Southampton, but it is known to spend the winter in the open waters of this latitude, so it evidently does not travel southward far in the fall, and during favorable seasons probably lingers in Sir Thomas Roe's Welcome, Fisher Strait, Fox Channel, and even in Frozen Strait. In summer it is not nearly so common as the King Eider, and it frequents the largest lakes and the bays and inlets more than does that species. Both species arrive at about the same time in the spring at their nesting-territory, and the males leave their mates at about the same time in mid-summer. The nesting-grounds of the two species are different, however, the Northern Eider choosing off-shore islands, or islets in the large lakes, the King Eider the open barrens, often at considerable distance from the water.

Fall Records: No Northern Eiders were collected from the rafts of young King Eiders, which were seen in the large lakes near the Post during the late summer of 1929; they were seen in the bays and coves, however, where they swam about in small family companies, or occasionally in compact flocks. It is my opinion that most young eiders seen in the salt-water at this time were of the present form, for three such birds, killed by the Eskimos in latter August near Bear Island, and one collected in South Bay by Jack Ford on September 12 (a well developed individual with but little down in the plumage) all proved to be Northern rather than King Eiders.

Several adult females, either with or without young, were seen from time to time in South Bay; but no males, or birds thought to be males, were seen anywhere in the vicinity of the Post. I did not once record the species with certainty on the trip to Cape Low, although I was constantly on the lookout for it. On the trip to Seahorse Point, females and young were seen at several places, notably at Native Point and near Kikkuktowyak Island, where the Eskimos told me it nested in considerable numbers.

In the waters about the Semple Islands on September 21, I saw at a distance three white-backed eiders which I think must have been of this species. They were very wary. The coloration of these birds seemed to be somewhat blotchy, as if some sort of moult were on, but all could fly perfectly. Three more such birds were seen three days later, near Seahorse Point.

On October 14 and for several days thereafter flocks of eiders were noted off Seal Point, and some of these came close enough for me to determine that they were Northern rather than King Eiders. Most of them were in the plumage of the female or young, but there were a few with white patching on the back.

When I questioned the Eskimos about the late summer distribution of the male eiders, I got no very satisfactory reply. All the hunters agreed that they "went somewhere," and that certainly they did not fly inland to any of the large lakes. None had ever seen a male in full eclipse, flightless plumage, and none remembered having shot one, the handsome breeding plumage of which was mottled with dull feathers.

Winter Records: Hall (1865, p. 151) states that "four flocks of eider-duck (*Anas molissima*)" were seen in the waters of Sir Thomas Roe's Welcome on March 6, 1865. In each of these flocks there were probably "a thousand birds, the males predominating." While this author, as well as others, calls attention to the wintering of eiders in this latitude, in such a way as to leave us with the impression that eiders are characteristic winter-birds, we did not find them precisely so. Father Thibert told me that he had seen great flocks in the vicinity of Eskimo Point (considerably to the southward), and both Muckik and Kooshook told me that they had seen large flocks in the region of Seahorse Point, but I think that no such flocks were seen anywhere along the Southampton floe during the winter of 1929-30, and certainly no mid-winter specimens of the present form were taken. Some of the brown *Mittek* seen or found dead during winter of former years may have been of the present species.

Spring Records: According to my journal, the King arrived earlier than the Northern Eider during the spring of 1930. I think, however, this was because of the rarity of the latter species, or because certain flocks of *Mittek* were not carefully identified by the Eskimos. Both Captain Murray and Captain Comer saw the Northern Eider earlier than the King Eider in the region of Capes Kendall and Low, and Hall, who is quoted above, does not even mention King Eiders among the wintering or early spring flocks of "eider-ducks" in the Welcome. In 1905, at Manico Point, Captain Comer noted "Eider Ducks" as "quite plentiful" on May 20. On the 24th he noted that they were "beginning to mate." And he did not even see the King Eider apparently until considerably later (1905, MS "field-notes").

The first ducks, which I was certain were of the present species, and which I personally identified, were noted at the floe near Native Point on May 26. At that time the birds were in pairs. They swam about quietly at a good distance from the "shore," staying close together and, when disturbed, rising heavily into flight, the female nearly always making off before the male. In flight the wings moved in a labored manner, though the heavy bodies swung along rapidly. The head was held straight in front of, or a trifle below the body, and

the bill was pointed downward in a very characteristic attitude. The birds kept so far out that I could not get a shot at them. Once I noted that they gave a whistling vocal sound as they flew by. The species was observed at the floe from May 26 to 29, and toward the end of this period, especially on the warm days, there was a good deal of mild combat among the males.

On June 13 Jack Ford and Santiana saw a great many Northern Eiders about the half-thawed lakes to the westward of Itiujak. The islands in these lakes were probably favorite nesting-grounds. The birds were mating on every hand. Much of the time they stood or walked about on the ice. Up to this time none had been seen in the vicinity of the Post.

On June 17 several males and females, many of them already mated, appeared at the mouth of the small river just west of the Post. Here they rested at the edge of the ice, or swam about, diving for food at intervals. Mating King Eiders were also seen at this time, so it is impossible to say which of the all but incessant cries belonged to one species or the other. Everywhere the groaning and hooting of the ducks resounded, now in a dull monotone, now in a series of wild bellowings, which the Eskimos very much liked to imitate. Close by the cries had a mellow, soft quality, which has been likened to the cooing of doves. As the birds produced these sounds, they bowed their heads a little and shook their bills from side to side tensely, if they were standing on the ice; if in the water, they stood up a little, then sank far forward as they cried out, pushing their clumsy bodies now this way now that with a stroke or two of their big feet. On June 18 I here shot a male, but was not able to retrieve it. I had some of my most exciting experiences in the North Country while hunting these birds. In trying to get within shooting distance it was necessary to leap from ice-cake to ice-cake at the mouths of the rivers, and it was never possible to tell how strong the ice would be, whether or not the edges would give way with a sickening splash, or whether the cake would swing about and break in the middle, the two pieces settling themselves in the water anew. The Eskimos never seemed to mind leaping about on these floating bits of ice; but I never became used to this sort of stalking.

On June 25 Jack Ford secured a splendid male for me at Prairie Point. The bird was quite fat, and the gonads were much enlarged. In the stomach were the remains of some sort of mollusk, the outer surface of the shell being marked with fine brown vermiculations.

On June 27 Noah brought in a set (perhaps incomplete) of four fresh eggs, which he had found on the larger of the Tern Islands.

By the end of June several pairs were seen daily on or about the large lake inland from Seal Point, where they were later to nest on the small islands, which were occupied also by colonies of Arctic Terns. On June 29 and 30 Keetlapik and Noah found several eggs on the Tern Islands, and brought in one incomplete set of three.

On July 2 Noah gathered about half a bushel basketful of eggs, most of which were of this species. Among them was a set of seven which I preserved. Most of these eggs had been found on islands in the large inland lakes.

On July 6 I saw eight birds, all paired, at the large lake near Seal Point, and succeeded in getting one male. This bird was not very fat, but the gonads were much enlarged. The stomach contained a good deal of gravel and the remains of some blue-gray and white clam-shells. On this date I also found a nest (containing one egg) near the edge of a small, grassy island lying about fifty feet from the shore. Since the female had had a chance to leave quietly the egg was carefully covered with down.

On July 7 I shot another male at the Tern Islands, to which I had walked over the rough, rotten ice. Here I saw at first only males; later, after the females had left their nests, they

were joined by the males and the several pairs flew or swam about together. I saw no evidence whatever of polygamy or polyandry among these pairs.

On July 8 Noah brought in a set of three eggs from the Tern Islands. On the same date I found a nest containing five eggs in a somewhat unusual situation along the shore of one of the larger inland lakes, and not on any sort of island. The female flushed noisily, defecating all over the eggs and nest as she flopped out to the middle of the lake, where she quacked hoarsely. Her mate did not appear. On the following day I returned to this nest and found that it had been destroyed by Herring Gulls. All the eggs had been stabbed in the side, and their contents eaten; the nest was strewn all about the place, and even the depression in which the down lay had been scratched out as if maliciously. The mother bird was nowhere to be seen.

On July 9 the nest, which I had found on July 6, contained four eggs, so evidently an egg is laid daily once the set is begun. When I first came up the male was standing by the female at the nest. He swam away immediately when I approached and later the female flew off to join him, leaving her eggs uncovered. I waited in a secluded place nearby and saw the female swim back slowly, but the male did not return. On July 12 I collected the full set of five eggs from this nest after photographing it. On this date the female waited until I almost trod upon her before she left. Then she trailed slowly out over the water and waddled to a flat rock, where she stood preening her feathers for half an hour. No male bird was seen anywhere about the lake on this date.

On July 14 Jack Ford saw several males in small flocks in the water about Bear and Tern Islands. When the females flew off they were not joined by their mates.

On July 16 I saw a solitary male at a lake near Seal Point. I think this bird had lingered inland because of the late laying of eggs by a female, whose earlier set had been taken.

On August 4 Jack Ford, Constable Stewart of Chesterfield, and I made a special trip to the Tern Islands to study mid-summer conditions there. We found many female Northern Eiders among the hundreds of terns, and located eleven nests, two of which contained heavily incubated sets of four eggs; one a set of five eggs which appeared to be fresh; and the others each a smaller number of eggs. We collected two adult females on this date, one of which had been caught some time since in a steel trap set by an Eskimo. This trapped bird, which was still alive, had been living on grass. The eiders circled about anxiously all the time we were at the island, the females quacking in hoarse voices and sometimes flying quite near. When they came to rest they swam together in little companies of three or four. I did not see any downy young, though the Eskimos told me they had seen young eiders swimming near some of the less frequently visited islands at the head of the Bay. I never succeeded in collecting a downy young of this species. The rocks along the shore were liberally covered with pink-colored excrement of the eiders and Mandt's Guillemots.

No male Northern Eider was seen in the region after July 16. At Chesterfield Inlet during later August and early September, many female Northern Eiders (no King Eiders) and their young were seen in the salt-water not far from the shore. No males were seen, however, and no family-groups were noted on any of the lakes. In this connection it is interesting to note that Rae, while voyaging through Sir Thomas Roe's Welcome in the late summer of 1846, noted a similar absence of male eiders. He observed, on August 14 (1850, pp. 180-1) that there were "no male eider or King Eiders anywhere."

Annual Routine: The Northern Eiders, which nest on islands in the coastal lakes and in the bays and coves about Southampton, probably do not move very far away from their breeding-grounds during the winter. Many of them congregate in the waters of Sir Thomas

Roe's Welcome; others gather in Evans Inlet or Fisher Strait between Southampton and Coats, or even in the rougher waters of Fox Channel to the eastward. They follow the opening leads of water as spring advances and make their way in across the frozen salt-water to the pools, which open at the mouths of the rivers. Here they mate and wait about until the ice rots and breaks up in the lakes or about the islands in the bays and coves.

The nest is usually built in an exposed place, either just above high tide-mark on the offshore islands, or not far from the edge of the islands on the lakes. Eggs are laid daily. The smallest set of eggs which came to my attention was one of three eggs; the largest, one of nine. The male stays with the female almost constantly while she is laying, but leaves her after the set is completed, apparently not waiting until the young have hatched. If the first set of eggs is destroyed, another is laid immediately; and in cases of this sort the male sometimes remains with the female until all the second set has been deposited. Only the female incubates.

The males, upon deserting their breeding grounds, congregate somewhere in the salt-water, probably not far away from the Island, where they undertake their post-nuptial moult. Some of these male birds were seen in the region of Seahorse Point in September.

The young birds make for the water very shortly after they hatch. Those which hatch in the lakes make their way as soon as they can to the salt-water, where they swim about and learn to dive for food while the mother undergoes her post-nuptial moult. The enemies of this species are the same as those of the King Eider.

Fleshy Parts: The eyes of all adult Northern Eiders were dark brown. The bill of the male was dull yellowish green, brightest on the lateral frontal processes, and rather gray at the nail. The bill of the female was dull greenish gray. The feet of the male were dull yellow; of the female dull yellowish brown.

Other Records: Many of the early explorers and writers mention eiders, but it is evident that no attempt was made in most cases to determine whether the birds encountered belonged to this race, or to the more southerly *dresseri*. Preble (1902, p. 87) is of the opinion that the birds found on Parry's second voyage, at Winter Island, near Melville Peninsula, and recorded as *mollissima* (Richardson, 1825, p. 370); the specimens received from Hudson Bay by Blakiston, and recorded as *mollissima* (1863, p. 150); and the specimen collected by Rae and recorded in the British Museum Catalogue of Birds, are all *borealis*. Preble, however, (see above) apparently did not find *borealis* at Cape Eskimo.

Eifrig (1905, p. 237), including all his remarks upon the eiders under *borealis*, says: "This fine duck was found to be common around Fullerton and in all the region to North Devon. Some remained in the open water all winter and were frequently shot for food. . . The species breeds on rocky islands, placing its nest on sandbars, in grass between rocks, or in any available place near the shore. One set of 9 eggs was taken on Southampton Island, June 17, 1904. . . Two incomplete sets of 4 eggs were taken at Fullerton, July 17, 1904."

Low (1906, p. 316) says: "A number shot along with the American Eider, in the neighborhood of Fullerton. Skins from Fullerton." I think it likely that most of the birds seen in the Fullerton region were *borealis*, though Low's statement does not give us this impression.

Mathiassen did not record it in the vicinity of Duke of York Bay during the fall of 1922. Mr. Ford saw eiders commonly at Coats Island during the period of his residence there, but could not be sure which race was represented. Soper (1928, pp. 89-90) evidently found only *borealis* on Baffin Island. Mr. Swaffield took specimens which are not clearly either *borealis*

or *dresseri*, but likely intermediate between the two, during 1929 and 1930 on Mansel Island (Sutton, 1932a, p. 42). We saw many eiders, either *borealis* or *dresseri* or both, in the Chesterfield Inlet region during the late summer of 1930, but collected no specimen (1931c, p. 156). The A. O. U. Check-List of North American Birds (1931, p. 56) includes the "eastern Arctic islands, south on the Atlantic coast to Labrador" in the breeding range of the present race.

Somateria mollissima dresseri Sharpe. AMERICAN EIDER.

All of the specimens of *S. mollissima* taken in the Southampton region during my stay prove to be *borealis*. According to some authors, however, the more southern *dresseri* is occasionally found in this latitude, and it should therefore be looked for with care, especially along the western coast of the Island.

Preble (1902, p. 87) says: "Flocks of a hundred or more were often seen north of Fort Churchill, and a female with young two or three weeks old was observed August 3, 50 miles south of Cape Eskimo." Eifrig (1905, p. 237) does not list this race at all, apparently believing that the only form found at this latitude is *borealis*. Low (1906, pp. 316-7) says, concerning this race, which he may have confused to some extent with *borealis*: "Common everywhere in Hudson Bay and to the northward, wherever small islands are found along the shores suitable for breeding. Very common on the west side of Roe's Welcome, but rare on the opposite side owing to the absence of small islands fringing Southampton. Skins and eggs from Fullerton."

Bent (1925, p. 102) says that this form "intergrades with *borealis* at the northern limits of its breeding range." Under *breeding range* he includes "as far north as Richmond Gulf, Southampton Island and Cape Fullerton."

Soper (1928, pp. 89-90) gives us a full discussion of *borealis* as he encountered it on Baffin Island, but does not mention *dresseri*.

Mr. Safford during 1929-30 took specimens at Mansel Island, which are clearly intermediate between *borealis* and *dresseri*, so the present race is to be apparently expected there as well as elsewhere in this latitude. I do not agree with Bent or the Committee of the American Ornithologists' Union (1931, p. 56) in including the whole of Southampton Island in the breeding range, however, for I am sure that *borealis* is the typical race of most of the Island, and, if *dresseri* occurs at all, it is only here and there along the western side, opposite to Cape Fullerton.

14. *Somateria spectabilis* (Linnæus). KING EIDER.

(Plate XIII, fig. 2; Plate XXII, fig. 16)

Eskimo Name: The Aivilikmiut called the highly ornamented spring males of this species *Kingalik*, meaning 'he has a nose.' The word was also sometimes applied to a human being, when the case warranted it. Practically the same word, *Kingaling*, is in use among the Eskimos at Point Barrow, according to Murdoch (1885). I do not care to dispute the various authors, who have called attention to the appropriateness of the English name we have given this 'regal' species; but it is decidedly interesting that both English and Eskimo names for the bird should begin with the *very same syllable*; and this sameness suggests that our name may actually have come, somehow, through the Eskimo language, perhaps through some of the early Arctic explorers. The Eskimos at Southampton seemed pleased to hear that our name for the species was *King duck*.

The females and drab-colored young males were known among both Aivilikmiut and Okomiut as *Mittek*, a word which is applied loosely to eiders of all sorts. I think *Mittek* must be an imitation of one of the low, conversational call-notes of the species. With this opinion Turner partly agrees, though he spells the word *Mitik*. As quoted by Bent (1925, p. 90) he says: "The females utter a grating croak while flying to or from their nests and hiss

while on the nest. This hissing sound gives rise to the Eskimo name of this species [in this case the Northern Eider], Mitik." Mr. Brandt tells me that a word approximating *Mithuk* is in use among the Eskimos in that part of Alaska which he visited.

Status: It is said that the King Eider spends the winter as far north as it can find open water (Bent, 1925, p. 116). According to the Eskimos it is not so often seen in winter as is the Northern Eider. It must be borne in mind, however, that during part of the winter season at least, most of the Northern and King Eiders encountered by the natives are very similar in appearance at a distance, and it is doubtful that the Eskimos ever make certain which species they are seeing.

As a migrant and summer resident, the King Eider is abundant, and a great deal commoner than the Northern Eider. In early spring it lingers about the floe, then gradually makes its way inland, where it nests as a rule on the high land among, or back of, the coastal lakes. It does not frequent the larger lakes and islands therein, nor does it nest on the off-shore islands in the bays and coves as does the Northern Eider. It is less common in summer in the rough eastern part of the Island than in the prairie-country. During migration it is found in abundance all along the southern shore.

Fall Records: I found the King Eider an abundant bird during my field-work in the fall of 1929. On August 19 the Eskimos brought me a half-grown young one, which had been caught on one of the lakes nearby. They also gave me two "stuffed ones," which had not been very carefully prepared, and which the dogs ate ravenously. On the following two days so many young ones were brought to me, alive and dead, that I finally had to ask that no more be caught for me.

On August 24 I observed a huge 'raft' of young eiders, which I think were all of this species, swimming about at one end of a long, narrow lake about four miles east of the Post. There seemed to be no mature birds with them, but four adult females, all of which could fly, were to be seen not far away in a separate flock. When I pursued the young birds they all dived at once, bobbed up in a compact mass, and swam away together in a close-knit company. They swam rapidly, holding their bodies low in the water, and dived with ease. They did not cry out. I could see that their wing-feathers were but little developed. *No adult males were anywhere to be seen.*

On August 25 at Prairie Point I noted many King Eiders, both old and young, but did not see any great "rafts." Here the female birds were swimming about with their progeny, which appeared not to be so fully developed as those on the north side of the Inlet. When close pressed, the mother birds went through all sorts of demonstrations to lure me away. They were especially given to dragging themselves through the water or mud, flopping along on their bellies, with feet hanging limp. The young fed much of the time by merely 'tipping' in the shallow water, though of course they could dive when this was necessary. Two small young, dead from an unknown cause, were found along the shore of one of the lakes.

On August 27 a large flock, which I thought to be of this species, were seen at sea not far from our camp at Four Rivers. From the spotted appearance of some of these birds I thought them to be males in the post-nuptial moult. Several broods were seen in the lakes not far inland.

At Hut Cove the species was rare. A mother and two young were seen on August 31. A few were noted at sea between Hut Cove and Cape Low. At Cape Low many females with young, as well as some flocks of young not attended by the mothers, were noted on September 2 and 3.

Between September 4 and 9 a few birds, both mothers and young, were seen at Four Rivers. During mid-September young birds were seen in the lakes, or in the salt-water, where most of them stayed near the shore and did not gather in the middle of the bays as did the young Northern Eiders. By September 16 most of the young were able to fly, though their wings appeared not to be fully developed. A specimen killed on September 16 had well developed wing-plumage, but there were traces of down along the flanks. Four other young seen on this date at Seal Point seemed to be a little undersized, but could fly well.

On September 17 several small flocks were seen at Seal Point. One flock, apparently a mother and six young, spent much of their time bathing and sunning themselves along a narrow sandy beach in the shelter of a low cliff. They splattered and dashed the water about, chasing each other in an agile manner, then crawled out to stand quietly on one foot or to lie down in the sand. All these birds but one could fly well. Flocks of birds which were noted out in South Bay, had difficulty breasting the wind as they flew; and they had to shake the water comically from their heads and bills as they swam through the crests of the white-caps.

On September 18 we saw several in the region of Native Point, where the Eskimos had been killing a good many for food. On the following day Jack Ford and I found many young birds swimming about at the mouth of Lake Brook, and I was much amused at watching my companion catch one in his hands. When Jack started after this bird it swam rapidly for a short way, then dived in the shallow water, came up, deliberately stopped swimming, and stuck its head under the water in a most ludicrous fashion. When we examined the wings of this bird we found them to be in good condition and apparently well developed; furthermore most of the other young birds had eventually taken flight; but this one evidently did not know how to take off, or had become too much panic-stricken to try to rise into the wind.

A good many of the eiders seen in the region of Seahorse Point were, I think, Northern Eiders, though a few King Eiders were seen here and there everywhere as we went along. On September 26 we saw about fifteen young birds swimming about at the mouth of the Anderson River. These birds would feed for a time, diving in the deep water, then come to the shelter of the bank, roll over on their sides in the water, put their heads under their scapulars, and doze off. Sometimes all the birds went to sleep thus, leaving none of their number on guard, and the natives easily killed them with their rifles. The call-note commonly given by these birds was a musical, low, rapidly repeated whistle. This is the cry which is responsible, I believe, for the Eskimo name *Mittek*.

During the first two weeks of October most of the birds seen in the vicinity of the Post were young. On October 13 I watched a flock of ten feeding along the shore in the shallow water at low tide. They did not dive; they merely put their heads under the water and then swam rapidly along as if pursuing some rapidly moving prey. After they had fed for a time, they drifted in toward the shore and went to sleep in the shelter of the high boulders.

On October 15 Jack Ford shot an adult female in the Bay. She proved to be in the post-nuptial moult. The old plumage was faded and worn. This bird, though not fat, weighed 4 lb. 7 oz., and evidently could fly perfectly.

On October 17 I shot three specimens, an adult female which could fly and two young males, at Seal Point. Jack Ford shot three young and caught one alive, which could not fly. The adult female which I collected had about half (one side) of her tail apparently missing as a result of an accident, which had involved the tail-bone.

I painted a life-portrait of the young bird and was much interested in its behavior during captivity. When held in the hand it bit hard with its blunt bill, first giving a vicious jab, then nibbling along with a trembling motion of the head. On the floor it ran about rapidly, making a loud pattering sound with its broad feet. In standing, it held its body high, and kept its head well down into its shoulders. It seemed to tire easily, whereupon it would comically plop down to the floor, breast first. Whenever we approached it, its heart beat rapidly and we could hear the loud thumping, especially when the bird was squatting on the floor. Once or twice it quacked.

One notable feature of this young bird's external appearance was the feathers of the auricular and cheek regions, which had precisely the *ridged* arrangement of the adult male, though the color-pattern was, of course, that of the female. The primary feathers and some of the smaller feathers of the wing, including the primary coverts, were strangely malformed, the shafts being swollen and of a wavy shape, probably as a result of some injury to the wing in early infancy, or because of malnutrition. Otherwise the bird seemed to be in perfect health.

On October 19 Keetlapik shot three young not far from the Post. On October 23 one was seen walking about on the recently formed salt-water ice, and Jack Ford saw one which had been frozen into the ice. On the following day a few others were seen walking on the ice. On October 29 Jack Ford and Keetlapik saw two resting on the ice. When these birds were frightened they rose high in the air, turned north, and *flew inland!* No others were seen in the vicinity of the Post after this date.

Winter Records: Father Thibert saw a *Mittek* flying high in air toward the north near the southernmost Noovoodlik, on November 14. This individual was probably lost.

On January 18 Muekik and Kooshooak reported having seen several in the open water about Seahorse Point during the preceding three weeks.

Mr. Ford remembered having seen two *Mittek* in January of a former year flying northward over the land at the head of South Bay. The weather had been rather mild, even rainy, and the birds were probably confused by the fog. Several of the natives also recalled having seen *Mittek* inland during the middle of the winter, and one or two dead, or nearly dead, birds had been found in the snow at considerable distance from water.

Spring Records: The first King Eiders arrived along the edge of the floe in the vicinity of Munnimunnek on April 17. Avimatuk and his son, as well as some of the other Okomiut, saw them.

On April 26 I saw several eiders at a distance along the floe south of Bear Island, and at least one came near enough for me to be certain that it was of this species. However, great flocks of the birds did not arrive until a little later.

On April 30 two huge flocks were seen flying westward along the floe. Nearly all were males in breeding dress, though there were a few (thought to be females) in brown plumage. The flocks kept well out from the edge of the ice, so we could not get a shot at them.

On May 2 Tapatai killed two males at the Native Point floe, and Jack Ford saw many large flocks, most of which he thought were males. On May 7 Kyakjuak, Pumyook, and other Eskimos saw a few large flocks flying far out in the ice-filled water beyond the *sheenah*.

On May 8 I had my first experience with migrating flocks of this species. The wind had been from the west and south, so that during most of the day there was no great expanse of open water at the edge of the floe. This brought the flocks of *Kingalik* in to us, in their search for a resting-place and feeding-ground. Flocks of one hundred to several thousand passed all day, some of them so great as to have the appearance of flat clouds. The flocks

turned now this way, now that, searching for water, and frequently came straight towards us, as if believing that our presence indicated an open pool. With the going out of the tide, a narrow channel opened in the vast, purple-gray field of ice, and along this blue-black, saline river the eiders swarmed, flock after flock sweeping majestically along in almost military formation, sometimes more or less in "Indian file," sometimes abreast, the flocks often extending entirely across the open channel. Kooshooak and I finally went out in a canoe to shoot some specimens, since the birds usually swung by just out of range from the "shore." I had little difficulty in getting eight birds, five males and three females. I was much interested in the behavior of these migrants. Though all of them were obviously moving northward as rapidly as the weather would permit, nevertheless their principal problem at the moment was the finding of open water, which meant not only food and rest, but also a haven from their enemies. While in the water they were mating too, the males going through grotesque bowings and upstandings to the accompaniment of weird groaning cries—"Ah-oo, Ah-oo," while the females kept up a continuous and rather comical din of low quacking which sounded like "Chuck-a-chuck, chuck-a-chuck," repeated incessantly. The whole vast icefield hummed with the wings of the flying birds and the throbbing of their courtship cries.

All the specimens taken were fat, and the gonads were much enlarged. One of the females differed from the others in that a new growth of down was apparently just coming into the belly region. This gave the inside of the skin a blackish appearance where the tiny pin-feathers clustered in close-set groups between the bases of the larger feathers. The stomachs, which were not well filled, contained the remains of mollusk-shells and bits of gravel.

From May 8 to 15 we saw flocks, which appeared to be almost constantly migrating, especially when we were near the open water. Occasionally a flock was seen flying across the ice far from the water's edge, turning and twisting about as if lost, but never turning back toward the south or east in their search for water. We saw them again at the floe from May 26 to 29. At this time mating activities were still going on, though many of the birds appeared to be paired.

On June 9 the first nesting birds were actually seen inland at Prairie Point, where a pair circled about me two or three times, obviously hunting an open lake. On the following day a pair, then later a small flock, were seen near the Post. On the 13th a pair were seen at the mouth of the little stream west of the Post. On the same date Santiana shot a male at the head of the Bay; but by the time the specimen reached me its "nose" had been eaten off. Such is one of the misfortunes of the collector of birds in Eskimo-land.

On June 15 I shot a mated pair not far from the Post. The female was much fatter than the male. The bill and feet of the male were brightly colored, but they were noticeably duller than in specimens taken at the edge of the floe early in May. This, I believe, was because the period of courtship was over. During the middle of June most of the birds observed were going about in pairs. They were very common at Itiuchuk and at Prairie Point. On June 19 a female with a fully formed egg in the oviduct was shot at this last-named place.

On June 21 one of the Eskimo boys killed a female, which had an egg in its oviduct; Jack Ford found a nest containing four eggs (an incomplete set) along one of the lakes at Prairie Point; and I flushed a female from the very middle of the dry prairie. She was immediately joined by a male.

On June 23 I flushed a female from a nest containing five eggs, situated in the open, on a

hillside near Prairie Point, nowhere near a lake. The bird first befouled the eggs with excrement of a violent odor, then wallowed away on the ground as if crippled. When she started to fly she was pursued almost immediately by *four* males. This, I venture to suggest, may be evidence of polyandry.

On June 25 I flushed a female from a nest containing six eggs, not far from Poorhouse Hill. This nest, which was well-lined with darkly colored down, was placed on a knoll in a small upland marsh, where there was very little water. The eggs were somewhat incubated. On the same date, I found a nest containing two eggs in the middle of a wide stretch of ground at a considerable distance from any lake. Several females were seen flying about by themselves, either singly or in small flocks, though at the mouth of the stream just west of the Post male birds were to be heard hooting nearly all day long.

On June 29 I saw *eight* male birds chasing one female about a small, shallow lake. On June 30 I collected two males and one female, and found a nest, containing five considerably incubated eggs, on a low wide peninsula about ten yards from the edge of a lake, the only nest of this species which I found in such a situation. In males taken on this date, as well as in the one collected on July 1, the fleshy parts were very dull, especially the swollen base of the bill which was, by this time, beginning to shrink. I saw no more male King Eiders after this date.

On July 7 several small flocks of females were observed flying about at the mouth of the Koodlootok River. On July 14 I saw flocks of females, of three, seven, and nine birds respectively, flying about the open country. Their behavior puzzled me. If they had nests, why were they not then incubating? On July 16 I shot one of these birds and found the belly not to be bare of feathers, so I think that at least part of these wandering females were non-breeding birds. The extraordinary feature of their behavior, under these circumstances, is that they evidently followed an instinct to remain about the nesting-grounds rather than to accompany the males to their summering-grounds in the salt-water.

On July 18 a female and four small young were seen at a lake far inland from the Post. On July 19 a female with five newly hatched young were seen in a shallow lake near the Koodlootok River. The mother bird quacked and croaked and flopped about in the water in a frenzy while the young dived and came up in the grass along the shore. By searching carefully I found two of these. They were absolutely motionless when I found them, and even when I picked them up, they uttered no cry.

On July 21 I examined a non-breeding female, which had been killed for food at Seal Point. On July 23 I saw a large flock of brown-colored birds near the mouth of the Kirchoffer River, which I think were non-breeding females, or birds whose nests had been destroyed. There seemed to be no males among them.

On July 26 I encountered a female with six well-developed young still in the down, swimming about in the brook west of the Post, near its mouth. I caught one of the young, a male. The cry of the mother bird was a deep growling *quack* or *quock*.

On July 30 I observed a female, which was accompanied by an unusually large brood of eight young. Upon looking closely at these I found that they were of two sizes, four being but half as large as the others. I am sure there were two broods with this female; the mother of one of the broods probably had been killed, or had deserted her offspring. By August 2 large "rafts" of young, and a few adult females also, were beginning to gather in the larger lakes. The largest such companies were seen in the very lakes where they were most abundant during the fall of 1929. Judging from the fact that but few female birds are seen with the young at the time of their "rafting" I am inclined to believe that many of the females

desert their progeny at this time and make their way out to the salt-water, where they gather in great flocks to undertake the post-nuptial moult.

Annual Routine: The King Eider spends the winter as far north as it can find open water. At this season it doubtless associates with the Northern Eiders and also to some extent with the American Eiders. As spring advances, it moves not only northward, but also, as the breaking up of the ice permits, landward, toward its chosen nesting-grounds. It begins to mate on the first warm days of spring, probably before it actually arrives at its nesting-territory. Whether the species is usually monogamous¹³ is more than I can say. At Southampton mated birds appeared to be fairly constant during the egg-laying period, though I observed behavior which suggested both polygamy and polyandry. The birds migrate in great flocks, moving northward chiefly on the warmer, calmer days, and making their way along the open leads in the ice as fast as possible. In the earlier flocks males are more numerous than females.

They nest, not on the off-shore islands or on islands in the larger lakes, as does the Northern Eider, but in the middle of the tundra, often far from a lake, and only infrequently near any sort of body of water. Furthermore, as has been noted by several authors (see, in particular, Bent, 1925, p. 111), they never nest in colonies, but rather in widely separated localities, sometimes miles apart, all through the barren interior. Only the female incubates. During the period of egg-laying the male, or several males, may linger in the nearest ponds waiting for the female to leave the nest. I have no definite data upon the period of incubation. The first eggs (an incomplete set of four) were noted on June 21, and the first newly hatched young on July 18.

Soon after the eggs are laid the males leave the breeding-grounds altogether and make their way to the salt-water, where they congregate in large flocks and begin the post-nuptial moult. The natives have seen but few such summering flocks of male eiders; but we all saw many flocks of brown-colored birds, which evidently were not breeding, and which were, I think, either sub-adult males not old enough to mate, or females which had failed to mate, lost their eggs, or deserted their young.

The young birds make their way, as soon after hatching as they can, to some lake or brook. When a few days old, they are sometimes deserted by their mother and have to make their way about as best they can. Sometimes they join another brood and are adopted by a new mother. Eventually they come together in great "rafts" in chosen lakes, where three or four hundred individuals may be assembled in one flock. By this time most of the adult females have gone to sea, though a few, which may have more than the usual amount of maternal instinct, linger with the young in the lakes. However, the post-nuptial moult of the adult females takes place largely, if not altogether, in the salt-water, for it is here that they spend the flightless period. The young eventually make their way to the salt-water, usually before they are able to fly perfectly.

During the winter, the food of the King Eider is secured by diving, sometimes in very deep water. At this time mollusks are eaten. During summer, at which time it is not always necessary to dive for food, much grass and some water-weeds are consumed.

The principal enemies of this species are the Arctic Fox, which eats the eggs and captures the birds whenever possible; the Parasitic Jaeger, which captures the newly hatched young; the Herring Gull, which robs the nests whenever it finds the eggs uncovered; and the Eskimos, who gather the eggs and sometimes shoot, trap, or snare the old birds. The eggs are not often taken by the natives, however, because the nests are not easy to find.

¹³The word "monogamous" is used here in a broad sense.

Fleshy Parts: I made a series of sketches of this species at various stages in development. The newly hatched young has a dark, almost black eye, with greenish gray lids. The bill is pinkish flesh-color at the nail, along the sides of the lower mandible, save at the very tip, on the frontal lateral processes forward, to and above the nostrils, and along the cutting edge of the upper mandible; the tip of the lower mandible, the space between the nail and nostrils, and the region under the nostrils back to the base are dull blue-gray. The feet are brownish gray, darkest on the sole and at the heel. (Pl. XXII, fig. 16).

By the time the young bird is fully fledged, the bill has lost any such definite marking. A sketch made on October 18, of a live, fully-fledged young male, shows the following: eye, very dark brown; eyelid, dark gray; bill, dull gray at the tip, along the culmen, and on the edge of the base of the upper mandible, fading gradually into a yellowish or brownish flesh-color in the region of the nostril and backward over the lateral frontal processes, where the color is brightest; the edge of the lower mandible is dull brownish red; the feet are dull brown, darkest on the webs and at the joints.

The sketch of a freshly killed adult female, made on October 16, shows the bill to be an almost uniform neutral gray, a little lighter on the frontal lateral processes, and brownish red along the strainers of the lower mandible. The eye is dark brown, and the eyelids dull gray. The feet are almost yellow-brown of rather a light shade, brightest on the toes and darkest on the webs and along the back of the tarsus.

An adult male, sketched on June 30, 1930, just after it had been shot, was magnificently colored. The gibbous lateral frontal processes are a brilliant peach-yellow, fading into a bright red in the region of the nostrils invading the base of the bill and running forward almost to the nail. Behind the nail, and almost at the culmen, is an indefinite streak of pale apple-green which fades imperceptibly into the purplish gray of the nail. The tongue is dull pinkish brown. The eyes are very dark and the eyelids dull blue-gray. The feet are "bright straw-yellow, brightest when just lifted from the water."¹⁴

Other Records: Most of the early explorers mention eiders of one sort or another in their journals, and some of them speak of the wintering of the birds in northern waters. Edwards (1750, pl. 154) figures the present species from Hudson Bay, calling it the "Gray-Headed Duck." Linnæus based his description of *spectabilis* partly upon this figure. Blakiston recorded it (1863, p. 150), and speaks of seeing specimens from Hudson Bay. Richardson (1825, p. 373) states that it was seen about Melville Peninsula in numbers. Rae (1850, pp. 180-1) says, under date of August 18, 1847: "no male eider or king eiders [were seen] anywhere" in Roe's Welcome. Preble (1902, pp. 87-88) did not record it in the vicinity of Eskimo Point.

Eifrig (1905, p. 237) says: "Not as common as the preceding [Northern Eider]. Four skins, taken June 16 and 26 at Fullerton and Southampton. It is much less timid than the preceding species, allowing close approach. It does not remain in winter at Fullerton and breeds in different localities from those of *S. mollissima borealis*. It places its soft, down-lined nest on tussocks of grass along the shores and islands of inland ponds. It was common on Southampton Island where the other was scarce. A set of 4 eggs was taken at this place, June 28, 1904. . . . The stomach contents were fragments of mollusks, stones and sand."

Low (1906, p. 317) says: "Common in the northern part of Hudson Bay, especially so about the limestone islands, where they breed on the islands of the numerous ponds. Do not breed on the [offshore] islands like the American Eider. Very numerous on the east side of Roe's Welcome. Skins and eggs from Fullerton and Southampton."

¹⁴Quotation from my field-notes.

Mathiassen did not record the species at Duke of York Bay during the fall of 1922. Mr. Ford found it abundant on Southampton when he first went there in 1924, and found it equally common on Coats Island. Bent (1925, p. 118) includes "northern Hudson Bay (Southampton Island and Cape Fullerton)" in the *breeding range*, and under *winter range* says: "North as far as open water extends in Bering Sea and around southern Greenland." Soper (1928, pp. 90-91) gives us a good account of the species as it occurs on Baffin Island, where it is apparently not so common as in the present region. Mr. Swaffield collected a male in breeding plumage on Mansel Island, on June 5, 1930 (Sutton, 1932a, p. 42). We examined a young male at Chesterfield on August 21, 1930, and found that the species was known to breed thereabouts (Sutton, 1931c, p. 157). Captain Comer took a set of eggs on Southampton Island on July 2, 1904.

Genus MELANITTA Boie.

Melanitta perspicillata (Linnæus). SURF SCOTER.

Edwards (1750, pl. 155) figures this species, naming it the "Great Black Duck from Hudson's-Bay," and upon this figure Linnæus based his description of *Anas perspicillata* (cf. Preble, 1902, p. 88). A specimen, supposedly from Repulse Bay, is mentioned in the British Museum Catalogue of Birds.

Genus OIDEMIA Fleming.

Oidemia americana Swainson. AMERICAN SCOTER.

According to the British Museum Catalogue of Birds, a specimen of this species was collected by Rae at Repulse Bay. I am inclined to believe that this bird was taken farther south than Repulse Bay, probably somewhere in the forested section of the west coast of Hudson Bay. Preble (1902, p. 88) does not mention any other records from the Southampton region, though he speaks of several from Hudson Bay; Bent (1925, p. 127) states that the breeding range of the species extends northward "perhaps [to] Hudson Straits." The only scoter we saw along the west coast during the fall of 1930 was the White-winged Scoter, *Melanitta deglandi* (Bonaparte), which we recorded near Eskimo Point (Preble's "Cape Eskimo") on August 31 (Sutton, 1931c, p. 157).

SUBFAMILY MERGINÆ.

Genus MERGUS Linnæus.

Mergus serrator Linnæus. RED-BREASTED MERGANSER.

A specimen, said to have been taken at Repulse Bay, is accredited to Rae in the British Museum Catalogue of Birds. This specimen was actually taken probably considerably to the southward of the Repulse Bay region, perhaps at the mouth of one of the larger rivers. Preble (1902, p. 82) says: "A number were killed for food by the Indians at our camp on the Barren Grounds 50 miles south of Cape Eskimo August 3 to 8." Soper (1928, p. 87) says it was "observed sparingly about Cape Dorset and Fox islands [Baffin Island] in June and July, 1926." We saw one at Eskimo Point (Cape Eskimo) during the fall of 1930, on August 31 (Sutton, 1931c, p. 157).

Order **FALCONIFORMES.**Family **ACCIPITRIDÆ.**SUBFAMILY **ACCIPITRINÆ.**Genus **ASTUR** Lacépède.

Astur atricapillus atricapillus (Wilson). **EASTERN GOSHAWK.**

The nearest points at which this species has been taken are apparently Cumberland Sound, Baffin Island (Kumlien, 1879, p. 82) and Churchill (Clarke, 1890, p. 322). The former occurrence is purely accidental; at the latter place, however, the species may, in my opinion, occasionally nest.

SUBFAMILY **BUTEONINÆ.**Genus **BUTEO** Lacépède.15. **Buteo lagopus s. johannis** (Gmelin). **AMERICAN ROUGH-LEGGED HAWK.**

Eskimo Name: The Aivilik Eskimos called this bird the *Kahyook*. Old Angoti-Marik, or Scotch Tom, one of the dignitaries of the tribe, explained to me that this name was an imitation of the cry of the bird. In describing the creature further, he extended his arms, spread his fingers, and "soared" about screaming hoarsely in a high, thin voice. The imitation was a good one. I did not hear the Okomiut name for the species. Mr. Ford called it the Screech Hawk. Mr. Brandt tells me that a name commonly applied to it in Alaska is *Kay-u-kye-ule*.

Status: The Rough-legged Hawk may be found on Southampton at any time of the year; but it is nowhere really common, or regularly present, and it is decidedly rarer in winter than in summer. It is more often seen in the high country about Duke of York Bay, or along the cliffs bordering Fox Channel, than in the flat country between Coral Inlet and Cape Low. It nests only where the cliffs, ridges, or man-made beacons furnish it with a relatively inaccessible nesting-site.

Records: On February 25, 1930, the Eskimos Tapitai and Sheeloo (better known as Cabin Boy and Jasper, respectively) told me of a *Kahyook* which had been captured in a fox-trap at a salmon pond somewhere in the valley of the Kirchhoffer River. Up to this time I had not heard of the *Kahyook* and was considerably puzzled by their descriptions of a large hawk, a fierce bird, "larger than a *Kigavik* (White Gyrfalcon), but smaller than an *Ookpik-juak* (Snowy Owl), with dark coloration, and spots on the breast and wings." When I questioned them as to the feathered tarsi I was told that the feet were like those of other hawks. I became so excited about this specimen, which I felt sure was of a species I had not yet recorded, that I offered a considerable sum "in trade" for it. I was promised that whatever remains could be recovered would be brought in as soon as possible. The skin, by this time, had been removed from the carcass and was being used, I was told, as a towel.

I waited for weeks before any *Kahyook* was brought in. Then, one day, an old Eskimo brought the remains of the much talked-of bird. What I finally examined was the soiled skin of the head and back of a rather small Snowy Owl. I thought at first that the Eskimos had deliberately misled me, thinking that I would not know the difference between an owl and a hawk. I am convinced now, however, that the owl-skin was brought in only after the natives learned that the *Kahyook* itself had been destroyed, this to assuage my disappointment at not being able to examine the rarer bird.

On February 28 Jack Ford and Angoti-Marik saw a very dark Rough-leg (probably the

melanistic phase) near Native Point. Jack at first took the bird to be a raven; its flight was labored; the spread-out primaries were observed at a considerable distance. The two men were driving a dog-team at the time, and the dogs continued to look at and even to follow the flying bird, as if it had attracted them with its cries, but Jack heard no sound. Angoti-Marik explained to me that he had been familiar with this bird all his early life in the Repulse Bay region, where it "circled high in air, screaming loudly" when its nest was disturbed. He told me also of a nest he had found at Duke of York Bay, several years before. This nest, which was inaccessible, held six eggs, which were "almost white, spotted with brown."

On June 3 Tommy Bruce saw a mated pair not far from Munnimunnek Point, where he thought they must be nesting on the bluffs nearby.

On June 6 at Seal Point I saw a Rough-legged Hawk in very dark, virtually black, plumage. I watched the bird for ten minutes with my glass. It finally flew toward the distant Itiuchuk, progressing in wide spirals. On June 7 I saw another individual, this one in much spotted plumage, not far from the Post. It alighted on some rocks along a low beach. I finally got a shot at it; but it flew off, slowly, toward Seal Point.

On June 13 Jack Ford saw a pair near Itiujak. The birds circled and towered, giving him an excellent view of their mottled underparts. He saw another (or the same) pair not far from the Post, on June 15.

On June 15 one of the Eskimos brought in a neatly skinned specimen in much mottled plumage. I did not hear of this bird at once, and by the time it reached me its feet had been cut off by one of the mischievous youngsters. He had used these feet, I later learned, to nip and scratch his friends.

On June 16 I saw one flapping, soaring, and hovering at the head of South Bay about eight miles east of the Post.

On June 20 Tommy Bruce saw a pair and found a deserted nest on a beacon of rocks not far from Cape Low. I was told that these birds frequently nest in such a situation, where there are no cliffs.

On July 5 Father Thibert found an adult in normal, light phase, dead at Seal Point—probably the bird I had shot at on June 7. I preserved the skeleton of this specimen.

Other Records: It is surprising that Rae did not take a specimen of this species at Repulse Bay, where according to Angoti-Marik, it is a common bird. Preble (1902, pp. 106-7) does not cite any pertinent references, and Eifrig (1905, p. 239) does not speak of its occurrence anywhere in the region of Sir Thomas Roe's Welcome. Low (1906, p. 318), however, states that "a few were seen about [Cape] Fullerton in the spring."

Mathiassen evidently did not see it about Duke of York Bay during the late fall of 1922. Mr. Ford saw it on Coats Island where he regarded it as rare. Soper (1928, p. 106) gives us several records from Baffin Island, where it apparently is rather common. Many of the Eskimos, including Amaulik Audlanat, Kyakjuak, and Tommy Bruce remembered seeing *Kahyook* nests about Duke of York Bay, and they described these to me in full detail. We did not see it along the west coast of Hudson Bay during the fall of 1930 (1931c, p. 157). The Committee of the American Ornithologists' Union (1931, p. 69) includes "southwestern Baffin Island" in the breeding range, but does not include Southampton.

Genus *AQUILA* Brisson.

Aquila chrysaetos canadensis (Linnæus). GOLDEN EAGLE.

Edwards (1743, pl. 1) figures a specimen of Golden Eagle from Hudson Bay, upon which Linnæus later based his description of *Falco canadensis*. Mr. Ford saw two eagles, which

may have been of this species, at Coats Island, during the late summer or fall, probably during 1923, at least not long before he came to Southampton. I examined a large (probably female) specimen, which had been killed inland from Eskimo Point during the fall of 1929 (Sutton, 1931c, p. 157). This apparently is the point nearest to Southampton, at which the species has actually been taken.

Genus *HALLÆTUS* Savigny.

Haliæetus albicilla (Linnæus). GRAY SEA EAGLE.

Soper (1928, p. 106) includes this species in his Baffin Island report. Apparently it occasionally wanders westward from its breeding range in Europe, Iceland, and Greenland (see A. O. U. Check-List, 1931, p. 71).

Family FALCONIDÆ

SUBFAMILY FALCONINÆ

Genus *FALCO* Linnæus

16. *Falco rusticolus candicans* Gmelin. WHITE GYRFALCON.

(Plate XXIII, fig. 2).

Eskimo Name: I heard only one name for this magnificent bird: *Kigavik*. According to Hantzsch (1929, p. 18) the same name is in use in northeastern Labrador. Mr. Ford and Amaulik Audlanat told me the word meant something like "it picks at a bone."

Status: Amaulik Audlanat, who has completely circumnavigated Southampton, is of the opinion that the White Gyrfalcon does not nest anywhere on the Island. In the high country about Duke of York Bay and along Fox Channel he saw the Rough-legged Hawk and Duck Hawk in summer, and actually found nests of both these species, but he never even saw a *Kigavik* during summer.

During the fall migration, however, it is fairly common; for the eastern parts of Southampton and Coats Islands apparently lie on its normal migratory route. It occasionally occurs in winter, when food is abundant. At this season it is most commonly seen in the region of Seahorse Point, or at Cape Préfontaine, Coats Island. It is rarely seen in spring.

Fall Records: During the fall of 1929 I did not see this species until we reached Seahorse Point. There on September 23 among the soiled ice-cakes, which the currents and winds of Fox Channel had strewn along the shore, and the jagged cliffs which towered above them, I found *Kigavik* hunting. The bird circled over me, as if it had never before seen a human being, looking at me with its intelligent black eyes as it beat its pointed wings strongly, swung down to the brink of a low cliff, and alighted. I noted that its plumage was much barred and streaked, and that its general bearing was that of a sub-adult bird. As it flew by me it gave a low, grating cry.

On September 27 Muekik secured a very handsome adult female at Native Point. The bird circled low enough for the Eskimo to shoot it with his twenty-two rifle. The specimen was not very fat, and the stomach was empty. Though the plumage was considerably barred I thought it to be adult, because the skull was very firm, the gonads appeared to have been active during the preceding season, and the claws were hard and had the appearance of having been used a good deal. One other *Kigavik* had been seen near Native Point, two days previously.

On September 30 I shot a female specimen at the Post. When this bird first appeared it tried to alight on the little tin chimney of the servants' house. Then, beating its wings constantly, it dashed out to the end of the point, frightened a flock of White-rumped Sand-

pipers over the ice-filled water to Seal Point, and returned to perch for a moment on one of the rocky islets nearby. When wounded, it called out in a high, *chirruping* scream, and whirled to the ground. I had it alive long enough to note the amazing brilliance of its dark and lustrous eyes. It was quite fat. The stomach was empty and the gonads very small.

On October 1 two birds were seen in the vicinity of the Post. One of these, which we saw at close range, was much darker than the one taken the day before, being rather heavily barred. On October 4 a very white and rather small individual, probably a male, came by the Post. On October 7 I shot a male, which upon being winged gave out a loud, harsh cackle, which instantly attracted all the dogs at the Post. I had a hard time getting my prize away from the savage brutes, for they ran more rapidly than I toward the falling bird. This specimen, while in excellent condition, was not very fat. It weighed 3 lb. 12 oz. The gonads were very small. In the stomach were the remains of a Myrtle Warbler which must have been blown to Southampton during a recent gale from the west and south. This gyrfalcon, like many others which came by the Post, tried to alight on the flag-pole, the highest perch anywhere for miles about.

On October 9 I observed one flying high toward the cliffs at Itiujak. I noted that in long sustained flight the bird beat its wings for a while, then soared; and in its movements it was less energetic than a Duck Hawk.

On October 12 one flew over the Post and alighted on a large rock nearby, but I could not get anywhere near it.

On October 14 Jack Ford shot a beautiful female at the Post. When first seen, it was screaming loudly and chasing one of the small pups. Jack very ably described its cry as "like the squeaking of an old pulley." The stomach contained the remains of a lemming in white winter-pelage. The bird was very fat and weighed 5 lb. 2 oz.

On October 15 a very white and rather small individual tried to perch on one of the flag-poles. We all went after it, but could not, to our surprise, see it after it had dropped to the level of the snow, where its white coloration instantly blended into the background. I finally saw it alight upon a large rock where it sat for some time.

On October 18 a large bird, probably a female, flew by the Post and alighted for a moment on the beacon opposite the house. A wild snow-flurry enveloped us all within half an hour. I think the bird was making its way, in advance of the storm, to the shelter of the cliffs at Itiujak.

On October 19 Keetlapik and his party saw one about ten miles east of the head of South Bay.

On October 24 two birds, one noticeably larger than the other, visited the Post, both of them alighting on the flag-pole, and one fluttering for quite a time about the cross on the steeple at the Mission. Jack Ford saw one of these birds clearly and said it was heavily streaked below.

On October 25 a small heavily marked bird flew past the Post not far above the frozen cove. The children, who were playing, stopped their noise long enough to run and tell me of the bird.

On October 28 Jack Ford saw one chasing a flock of ptarmigans along the shore.

Winter Records: On January 18 Muckik saw one in the region of Seahorse Point, chasing a raven. The great black bird ducked this way and that, calling out in a terrified manner. Muckik told me the *Kigavik* would have killed the *Toologak* had the Eskimos not "come up just then."

On February 6 Muckik and Kooshooak saw one near Seahorse Point, and heard of others

seen by the Aivilikmiut hunters, who had been living in that section, and who had found (on January 18) the remains of a Dovekie which probably had been killed by one of these big falcons.

I did not see any White Gyrfalcons during March, nor did I receive report of any from the natives. Both Mr. Ford and Amaulik Audlanat told me, however, that they had occasionally seen the birds in March, and that in the vicinity of the Post, if they were seen at all in the spring, they would be seen in March.

On April 28 Pummyook and Kyakjuak saw two birds, perhaps a mated pair, and another single bird, on the cliffs along Fox Channel north of Cape Fisher, whither the Eskimo party had gone in search of caribou. They did not think the birds were nesting; but the fact that the hawks were perching on the cliffs in a place which ought perfectly to meet their breeding requirements, makes me think they may occasionally spend the summer on the Island.

Annual Routine: The White Gyrfalcon evidently migrates to a considerable extent, for it is regularly seen in fall in places where it is definitely known not to nest. In the high country bordering Fox Channel, where it may nest at times, it may be a relatively permanent resident. It evidently does not move any farther south in winter than it needs to in pursuit of food, though it apparently is not so well adapted to a hiemal existence in the North as is the Snowy Owl, perhaps partly because it does not usually depend so extensively upon lemmings for its food. Judging from our meagre data I should say that the spring return to the nesting-ground is made more directly than the migration southward in the fall, at which time the gyrfalcons probably pursue the flocks of shore-birds and ptarmigans a good deal. The species appears to have no natural enemies in the region. The Eskimos have no use for its body or feathers, and consequently do not kill it, unless they have nothing else to shoot at. It is only rarely caught in a fox-trap.

Fleshy Parts: The bill, eyelids, cere, corners of the mouth, and feet of all specimens taken were bluish white, sometimes of an almost waxen appearance. The tarsi occasionally had a tinge of green. The claws were sometimes grayish or blackish, but in fully adult specimens they were often very pale, almost whitish. The eyes were always very dark, the irides a very deep rich brown.

Other Records: Richardson (Swainson and Richardson, 1831, p. 28) describes a mature bird from Hudson Bay. According to the British Museum Catalogue of Birds Rae collected a specimen at Repulse Bay. Preble (1902, p. 107) mentions other records from the Hudson Bay region. Eifrig (1905, p. 239) merely lists the species among those encountered on the expedition of the *Neptune* through the Arctic Archipelago. Low (1906, p. 318) says of the species: "Seen along the highlands on the south side of Hudson Strait." Mathiassen apparently did not see it about Duke of York Bay during the late fall of 1922. Mr. Ford saw it repeatedly in the vicinity of Cape Préfontaine, Coats Island, during both the fall and winter; but he thinks it never nested there. Soper (1928, p. 107) gives us several records for Baffin Island, where in the region of Cape Dorset we also saw it (1930,* p. 204), during the summer of 1929. Mr. Swaffield did not take a specimen on Mansel Island during 1929-30, and we did not see it in the Chesterfield region during the late summer and fall of 1930.

17. *Falco peregrinus anatum* Bonaparte. DUCK HAWK.

Eskimo Name: The Aivilikmiut called the Duck Hawk *Kigaviatsuk*, which means 'little *Kigavik*,' the suffix *atsuk* being diminutive. The word *Kigavik* is customarily applied

**Cardinal*, II, 1930, pp. 204-25. Quotation from letter to Bayard H. Christy.

to the White Gyrfalcon at Southampton; but Hantzsch (1929, pp. 16-18 and 31) states that along the Labrador it is applied to hawks of several species. I did not learn of any special Okomiut word for the present species, though Hantzsch (see Soper, 1928, p. 107) gives *Kikkeveokjuk* as the name in use in Baffin Island.

Status: The Duck Hawk is rather a rare and decidedly a local summer resident, much commoner in the eastern higher part of the Island, than in the flat country from South Bay westward to Cape Low. Its summer-range is determined in large degree by the presence of cliffs where it may roost and nest, though it wanders widely in search of food, and especially in the fall may live for weeks at a stretch along the beaches where shore-birds are abundant, but where there are no perches or lookout posts higher than the boulders, which stick up here and there in the sand. In the vicinity of the Post it was seen chiefly along the low cliffs at Seal Point. At Prairie Point, where shore-birds were very abundant during late summer and fall, it rested on the high rocks at Itiuchuk and flew down to the shore to hunt. At Itiujuk, among the cliffs at Seahorse, and elsewhere along the Fox Channel shore, it was comparatively common. It was not seen at Cape Low.

It is one of the earliest birds to arrive in spring. It probably follows the flocks of migrant passerine birds as they move northward, preying upon them as they go. It lingers in the fall until the last of the shore-birds have departed.

Fall Records: On August 25, 1929, a large-sized young bird was seen flying across the coastal lake-belt at Prairie Point. It was escorted by a screaming swarm of Arctic Terns and noisy, fluttering hordes of shore-birds which milled about it, until it had passed far to the eastward. As it sped along, it swooped at an Old-squaw which dove in terror; and chased a Pacific Loon apparently in play.

In the middle of September a slight migratory movement of the species was noted in the vicinity of the Post, where during the previous weeks we had not seen it. On September 12 one was seen perching on a high boulder. It spent much of its time chasing Red Phalaropes, and in circling high in air where the buffy underparts took on a somewhat reddish tinge at a distance. On the following day Jack Ford watched one catch a White-rumped Sandpiper on the point opposite the Post buildings. It ate its prey on a rock. On September 15 two immature birds visited the Post at noon and attempted to alight on the tip of the flag-pole. I did not have opportunity to observe these birds very clearly, but they seemed to me to be a little too large for Duck Hawks, and they may have been gyrfalcons. Their flight, too, was rather deliberate for a Duck Hawk. On September 16 and 17 a brightly colored and rather small individual, probably a male, was seen several times at Seal Point, perching on the low cliffs.

On the trip to Seahorse Point it was seen several times after we had reached the high country. On September 19 one was seen at a distance just west of Leyson Point. On the following day two were seen at the mouth of the Anderson River. On September 21 two young male birds were seen and collected, the first one along the Anderson River, the other near Seahorse. Both of these specimens were very fat. Their stomachs were empty. One bird was observed to chase a flock of shore-birds; the other was in pursuit of a loose band of redpolls, which flew about the rough boulders at the crest of a cliff.

On September 22 at Seahorse Point at least three birds were seen along the high cliff, which faced the bleak waters of Fox Channel, and an adult female (very fat) was taken. When we first came to the base of the cliff, this bird was perched on a prominent pinnacle, screaming loudly, as if there were young birds in the vicinity. She was very bold, but did not attempt to strike at us. The male was more wary, and did not even come close enough

for a shot. On the back and wings of the female were a very few dull brown feathers of the immature plumage. The stomach was filled with the remains of at least one Purple Sandpiper, easily identified by the orange legs and feet. Streakings of excrement on the cliff faces showed either that these birds had been living in the vicinity for some time, or that they had actually nested there, though it is strange that not more than one young bird was seen. On the following two days adult Duck Hawks were seen repeatedly, but it is thought that these may have been the same individuals.

On September 24, 25, and 26, Duck Hawks were seen along the beach at the mouth of the Anderson River, and in the remarkable "Devil's Gorge" of this stream. I located one place where the birds had apparently nested during the preceding spring, and I think the young birds were still frequenting the place. An immature female was collected on September 25. In the stomach were the remains of a lemming.

On September 27 Mr. Ford saw one flying near the Post buildings. None was seen after this date.

Spring Records: On May 19, 1930, at the cliff at Itiujuaq, I saw and later collected an adult female. The specimen proved to be in good condition, very fat, and the stomach held the remains of a Savannah Sparrow. Judging from the absence of any extensive white-washing along the cliff-face I should say this bird had only recently arrived. Very likely it had moved northward with the flock of Snow Buntings, which were feeding in the bare spaces at the foot of the cliff. On the back and wings of this bird were a very few feathers of the immature plumage. Tommy Bruce saw another bird on the following day.

The cliff here, which was about two hundred feet high, was nearly perpendicular for much of its length. Amaulik Audlanat told me that he had known the *Kigaviatsuk* to nest there, but that he had never seen ravens there in summer.

On June 2 according to Keetlapik the pair of Duck Hawks, which had nested for years along one of the low cliffs not far from the mouth of the Koodlootok River, returned to their summer home. They appeared to be mated at the time they arrived.

On June 10 I saw a male at the head of South Bay. It was perched on a high boulder, fluffed out as if it had just eaten to the point of satisfaction.

On June 22 I saw one at Prairie Point flying along the shore. It headed straight across the Bay, as if bound for the mouth of the Koodlootok River. On June 25 I saw one at Poorhouse Hill, where on one of the low cliff-like ridges I had thought I might find a nesting pair. Single birds were noted at the head of the Bay on July 14, and at the mouth of the Kirchhoffer River on August 4 (Angoti-Marik).

Several trips were made to the little gorge of the Koodlootok River by Keetlapik in the hopes of finding the eggs or young on the ledge where the birds were known to nest. But during latter June and July none were seen anywhere in that vicinity. I fear they had been killed or frightened away.

Annual Routine: The Duck Hawk does not remain anywhere about Southampton through the winter. It, however, returns from the south early in the spring, as soon as there is any assurance that it will find food in the form of smaller birds. It makes its way directly to the cliffs and rough country, where it nests, roosts at night, and rests between hunting excursions.

During the late summer and fall the young birds wander a good deal, especially along the shore, where they feed upon the abundant shore-birds. This wandering rarely takes the form of any definite migration; but it means that individuals sometimes appear and remain for a time in sections where they are not seen during the rest of the year.

The Duck Hawk has no natural enemies on the Island, with the possible exception of the raven, which may upon rare occasion attempt to steal its eggs. Its presence in the region has little effect on the status of any other species of bird, principally because it is so rare, and also because the birds, upon which as a rule it preys, are themselves so widely distributed and abundant.

Fleshy Parts: All specimens collected had amazingly lustrous eyes, the irides of which were very dark, rich brown, of a shade so dark as scarcely to be distinguishable from black at a little distance. The eyelids, cere, and corners of the mouth of the young birds were dull blue, sometimes with just a tinge of yellow on the cere. In the adults, however, these areas were dull, rich yellow. The feet of the young birds were dull greenish blue, the toes apparently turning yellow in specimens secured September 21. The feet of the adults were dull chrome yellow, almost orange, on the brightest parts of the tarsus and at the joints of the toes.

Other Records: The earliest reference to this species which I have found, curiously enough, occurs on a map, which was used to illustrate Captain Luke Foxe's narrative of a voyage in search of the North-West Passage in 1635. This old map shows "C: S.hampton, C: Pembrook, C: Comforth, and C: Nestd" and the place now known as Seahorse Point (and which had been previously so named) is marked with the letter *H*, which, according to an explanation at the top of the map, indicates that the place was at that time at least sometimes called "Perigrenne." I am not informed as to what this name *Perigrenne* signifies, but it is easy to infer that it was given because Duck Hawks, American representatives of the European Peregrine Falcon, which were seen there, had suggested the name to the explorers who saw them. The reference is the more interesting in that I saw Duck Hawks at that very spot almost three hundred years later.

Other records pertaining to the Duck Hawk in the Southampton region are not numerous. Bell (1885, Appendix III, p. 54DD) tells us that two young birds were killed at Marble Island, not far from Chesterfield, on September 1. Preble (1902, p. 107) saw one on the Barren Grounds south of Cape Eskimo on August 5, 1900. Eifrig (1905, p. 239) says: "An immature bird was taken at Fullerton, June 27, 1904." Low (1906, p. 318) says: "The Duck Hawk is more common than the Gyrfalcon, breeding on the face of steep cliffs, and making its presence known by its shrill cries. Skin from Fullerton." Mathiassen did not record it from Duke of York Bay. Mr. Ford saw it frequently on Coats Island, where it nested on the cliffs at Cape Préfontaine along with the murre and Glaucous and Herring Gulls. Soper (1928, p. 107) gives us several records from Baffin Island, where it nests. Many of the Eskimos, Amaulik, Angoti-Marik, and Shookalook in particular, found the bird nesting in various parts of Southampton, especially about Duke of York Bay, at East Bay, and at the mouth of the Koodlootok and Kirchhoffer Rivers. Amaulik found a nest in June, 1925, with four eggs, at Duke of York Bay.

Mr. Swaffield did not take a specimen at Mansel Island during 1929 and 1930. We recorded it several times in the vicinity of Chesterfield during the fall of 1930 (1931c, p. 157).

Falco columbarius columbarius LINNÆUS. EASTERN PIGEON HAWK.

Mr. Ford saw a very small "*Kigaviatsuk*" which was "blue in color and stood straight up," during the fall of 1924, at the head of South Bay. The Eskimos, who also saw this bird, said they had never seen such a small hawk. It may have been a wandering migrant individual of the present species.

The nearest point at which it actually has been taken appears to be Churchill, where it was noted by Bell (1880, Appendix VI, p. 67c) and Preble (1902, p. 108).

Order GALLIFORMES.

Family TETRAONIDÆ.

Genus LAGOPUS Brisson.

18. *Lagopus lagopus leucopterus* Taverner.* WHITE-SHAFTED PTARMIGAN.
(Plate XIV, fig. 3)

Eskimo Name: Hantzsch (1929, p. 12) says that *Akkigek* is the name for "ptarmigan in general." He does not explain the etymology of the word. The Aivilikmiut at Southampton called the present species *Ahigivik* or *Akigivik*. Soper (1928, p. 104) gives the name in use on Baffin Island as *Arkagik*. According to Bernier (1912, p. 356) one of the Eskimo tribes calls it *Akkigilek*. Mr. Brandt tells me that the Alaskan Eskimos call the Willow Ptarmigan of that region *A-kay-heat*. The similarity of all these words is, of course, noticeable.

Status: The distribution of the races of *Lagopus lagopus* in northeastern North America is exceedingly interesting. Along the Labrador coast and in the more southern part of Hudson Bay, these large ptarmigan usually extend in summer throughout the Hudsonian Life-Zone as far north as there are any scrubby trees. At this point their range apparently stops, and that of *rupestris* begins. In these regions, then, the Willow Ptarmigan is assuredly a southern bird in comparison with the Rock Ptarmigan. In Baffin Island and on Southampton, however, the big species of ptarmigan again appears, and it is not surprising that it has proved to be subspecifically distinct from the more southern birds in view of the fact that their ranges apparently are not continuous. A survey of the situation in general leads us in fact to suspect, that the closest affinities of the White-shafted Ptarmigan of Southampton and Baffin Islands are with more northwesterly forms of *lagopus*, and that the range of the species may be more or less continuous throughout the Arctic Islands, the birds varying somewhat, of course, as local environmental conditions change.

The White-shafted Ptarmigan probably occurs the year round on Southampton Island, but it is definitely migratory. In the region of the Post and in the Cape Low region, none was seen during the late summer and fall of 1929, where in the late fall and winter they appeared in considerable numbers. Judging from the reports of the Eskimos, who have seen the birds flying across the ice or even the open waters of Frozen Strait, many, if not most, of these ptarmigan regularly move southward from more northern regions during the winter; and it is to be supposed that a good share of the summering individuals at Southampton fly across to Coats Island or farther south during the winter months. Doubtless the abundance of food to a large extent determines the winter-range of the species, and the principal factor which controls the winter food-supply is the snow-fall, not the temperature. If food in the form of willow-twigs and buds can be found above the snow or reached without too much scratching and digging, the birds have no trouble in subsisting during periods of very low temperature.

As a summer resident, the White-shafted Ptarmigan may be found anywhere on Southampton where there are wide meadows. It does not inhabit the ridges of the high country, and therefore is not found so extensively in the eastern part as from Munnimunek Point westward. In the winter it occurs nearly everywhere, both among the ridges and on the meadows, but it is especially fond of the ridge-sheltered plains. At the head of South Bay, it was decidedly rarer than the Rock Ptarmigan during the summer; in winter, however, the two species were about equally abundant.

*Annual Report Canadian Nat. Museum, for 1930 (issued April 4, 1932) pp. 87-88.

A good series of winter specimens was collected. All these, as well as a few, which are changing into summer plumage, have the white quills of *leucopterus*, and are at least in this respect indistinguishable from comparable topotypical specimens from Baffin Island. Since ptarmigan are known to vary a good deal, it is probably not amiss to present here measurements of some of the Southampton birds.

Measurements in millimeters of *Lagopus lagopus leucopterus* from Southampton Island.

MALES					
G.M.S. No.	C. M. No.	WING	TAIL	BILL ¹⁵	TARSUS ¹⁶
3401	109,975	216	125	12.5	38
3413	109,987	204	121	11.4	35
3414	109,988	199	124	11.5	34
3416	109,990	205	124	12	34.5
3430	110,004	197	120	11.7	36
3433	110,007	203	116	12	33
3450	110,023	204	117	12.1	34
3460	110,033	206	121	11.1	37
3502	110,070	206	116	11.4	34
Average		204.5	120.4	11.7	35
FEMALES					
3399	109,974	189	118	11.5	34
3400	.....	196	117	12	35
3417	109,991	196	110	12.3	35.5
3431	110,005	188	110	11	35
3451	110,024	190	112	11	34.5
3457	110,030	190	113	11.1	33
Average		191.5	113.3	11.4	34.5

Fall Records: All along the southern coast from Cape Low to Seahorse Point I kept a constant lookout for this species during the summer of 1929, but did not see a single individual, until the middle of the fall. I feel sure it had not nested that season anywhere in the vicinity of the Post.

On October 1 Keetlapik saw a large flock flying along the shore of the Inlet east of the Post. They were moving rapidly, high in air, as if bound for some distant point. Keetlapik was sure these were "large" ptarmigans. On October 4 I saw four ptarmigan tracks near the Post, which I thought looked too big for the tracks of Rock Ptarmigans.

No specimen was actually taken, however, until October 22, when Amaulik Audlanat and I travelled by dog-team to the head of South Bay to hunt seals. While Amaulik was making his way about the rough ice, I walked inland, heading toward the cliff at Itiujuak. I followed what appeared to be the deeply snow-buried bank of a frozen stream. The landscape was monotonous. Sky and snow were of about the same shade of misty, purplish gray, and my eyes became so tired in staring at the blankness about me, that I scarcely believed my senses, when I came upon any such exciting bit of scenery as a protruding willow-twig, or the neat direct trail of a fox. So endlessly white was the tundra, and so unbelievably great the distances between places, that, as I plodded on through the icy air, I found myself cultivating a vacuous state of mind, wherein even thoughts of more cheerful surroundings were not permitted to linger.

Suddenly I saw something sharply black on the snow, a glistening black spot, which

¹⁵The measurement of the bill was made from the anterior edge of the nostril to the tip of the upper mandible.

¹⁶The measurements of the tarsi here given are more or less approximate. I was not able to devise a consistent method of measuring them.

seemed to move about as if poised in mid-air. Could it be a glossy beetle, wandering about in the snow? In a moment I realized that I was looking into the face of a ptarmigan, not more than six feet away. Nearby were five other birds, all walking slowly, nibbling at the willow-twigs, and trailing their neatly booted feet in the snow.

When I took a step too close, the nearest bird stretched out its neck, lifted the narrow combs above its eyes, and gave an incisive, dry-sounding rattle, or cackle. Then all the birds whirled off across the drifts, their wide, black tails showing dimly in the distance, long after the white bodies had melted into the mistiness. I marked the spot where they appeared to alight, then examined the numerous trails that crossed and recrossed at my feet. Here were the remains of a low willow-bush, every protruding twig of which had been nipped off even with the crust; here were six neat, firmly encrusted beds in the snow, last night's roosting-quarters, in which were piles of droppings. A little to one side was another group of these roosting-places, and areas where the snow had been packed down by continuous treading. Evidently the birds had been living here for several days.

I followed the flock and again found them eating willow-buds. I collected three, two females and a male. These specimens proved to be in good condition, though not fat. The crops and gizzards were well filled with willow-twigs and buds, chiefly the former, since the buds were of very small size at this season. The combs were larger in the male than in the females, but they were so small that they showed only when the long feathers about them were carefully parted. The plumage had a slightly *yellowish*, rather than pinkish, cast just after death.

On October 27 one of the Eskimos told us that big *Ahiqivik* were very common along the valley of the Kirchhoffer River, where there was a considerable growth of willows. On October 28 Jack Ford saw a flock of about forty not far from the Post, and shot five. On November 16 Father Thibert saw "a large flock" about twenty miles west of the Post.

The fall migration of this species is sometimes spectacular. The Eskimos told me of seeing great flocks of the birds crossing the open waters of Frozen Strait, whirling along like immense snow-flurries. So abundant were the birds during the fall of 1925, so Mr. Ford told me, that in the vicinity of the Post flocks constantly swarmed about the buildings and dozens were killed daily. Bishop Turquetil told me he had once seen a flock crossing a large body of water in a high wind. As they made their way through the gale they followed the trough of a wave as long as they could, then rose abruptly, clearing the crest of the wave, and shot downward into the trough of the next wave as they slowly continued their way southward. Ptarmigan fly strongly and rapidly, but in cases of this sort many of them must perish, if they are so unfortunate as to be caught in a gale when crossing a wide stretch of water.

Winter Records: By the end of November the fall migration was over. Ptarmigan seen in a given locality after December 1 lingered in that locality, as a rule, for the duration of the winter, unless they were killed or driven out by constant persecution. On December 12 I shot five males from a flock of about thirty birds, which were feeding along the base of one of the ridges near the Post. On December 16 Jack Ford saw a flock along a frozen stream at the head of the Bay. On December 23 I secured a male and female from a flock of four, which I discovered by following their trails through the rough harbor-ice.

From January 1 to 18, 1930, Muckik saw many in the region of Seahorse Point. On January 25 I encountered a flock of seven birds, which were feeding in a wide meadow near one of the lakes. The wind was blowing over the tundra, and through the shifting veils of snow the plump birds ran, now this way, now that, paying little attention either to the

weather or to me. When I came too close, they stopped their feeding, looked at me with their bright eyes, and gave their rattling, scolding cry. This noise gave the impression, at a distance, of being produced Road-Runner-wise, by clapping the mandibles together. When near at hand I could see, however, that the jaws were held widely apart while the sound was being made.

On the following day I watched this flock again for some time, and found the place, where in seven consecutive foot-prints of my own trail across the prairie, the seven birds had spent the night. My big, deep tracks, widened a little by the ptarmigan, had furnished them with admirable beds. Later in the day, as I walked homeward, I had occasion to pass this spot again; and there in the snow, their bodies neatly filling the depressions just level with the surrounding snow, were my seven ptarmigan, all tucked in for the night in seven new foot-prints near the ones they had used the night before.

On January 29 I observed and tried to photograph a flock of ten birds, which were digging beds for themselves in firmly encrusted snow along the southern slope of a low ridge. They excavated altogether with their feet, and worked very diligently, clawing and digging, and kicking the snow about lustily. This was at about ten o'clock in the morning. After they had worked for half an hour they ran away in a long line to begin feeding. I noticed on this date, as at other times during the winter, that the red combs in both sexes were not to be seen unless the birds were excited, afraid, or curious; and that at no time, while the birds were merely walking about, was any of the black of the tail visible, the rectrices being completely covered by the long, thick upper and under tail-coverts.

In feeding the birds nipped off the buds and twigs rapidly with a peculiar double thrust of the head, one in seizing the bud, the other in wrenching it off. If they were so fortunate as to find a bush, which had not been trimmed down, they usually kept at the protruding twigs until the entire bush was reduced neatly to the level of the snow.

On January 30 Noah brought in two specimens from Salmon Pond, about thirty miles west of the Post. Both of these were females, weighing 1 lb. 5 oz. and 1 lb. 4 oz., respectively.

On February 11 I noted a rather wary flock of five. Their combs gleamed red just before they took flight. As they sped away, their bodies turned from side to side a great deal, so that, in spite of the blackness of the spread tails, it was difficult to follow them with the eye. On February 24 I observed that the birds were far less afraid of me when I kept between them and the sun. If I shifted position so as to place the birds between the sun and me they became promptly alarmed. One of these birds went three times into a sort of fit. It would burrow its head in the snow, take a comically brisk "snow-bath," race madly this way and that, then fly straight into the air about four feet, there to beat its wings frantically for a second or two, all to no seeming purpose, and drop to the ground. On the same date four specimens were saved from several, which had been killed by the Eskimos for food.

On March 6 two were seen at about 3:30 o'clock in the afternoon, digging their roosting-burrows. On March 14 I saw and photographed a flock of eleven birds. They gathered in the shadow of a large rock in a compact mass when I chased them; then, at a low signal from one of their number, leaped into the air and flashed away.

Spring Records: I observed no courtship antics prior to the middle of March, and the gonads of specimens taken during the winter up to this date showed no swelling. During latter March, however, the red combs above the eyes of the males began to swell, and there was considerable evidence of mating, especially on bright calm days.

On March 15 a flock of six birds were observed for some time. Two of these, which were larger, and which were, I think, males, occasionally stuck the feathers of their necks out,

as if in some sort of courtship display. They did not spread their tails, however, nor lower their wings. On this date Jack Ford also saw signs of mating activity at the head of South Bay. On March 20 Jack heard several males "crowing" at the head of the Bay, and saw two of them performing courtship flights. On March 26 near the Post I shot a male and female, the former with the combs much enlarged. The gonads of both specimens were, however, but little enlarged.

On April 7 Mr. Ford saw a large flock at Prairie Point, several of which were courting. He, however, noted no brown in the plumage. On April 30 Father Fafard killed four pure white birds for food, one of which, a female weighing 1 lb. 8 oz., I saved as a specimen. The ovaries were not much enlarged. By this time the willow-buds had increased considerably in size and the birds were living largely on these.

On May 4, a beautiful, bright day, I watched a flock of eighteen birds for some time. I witnessed no courtship display, though the combs of the males appeared to be large and bright. I killed a male bird weighing 1 lb. 9 oz., and found the gonads to be but little enlarged. In the white plumage of the head were a very few small brown feathers, the first sign of the pre-nuptial moult. A specimen shot by Kungualook at Seal Point on May 5 also had a few brown feathers on the head.

On May 6 I watched a large flock near the Post. Only a few had any noticeable brown feathering on the head, but there was much courtship activity. The males ran about excitedly, puffing out their neck feathers, lifting and spreading their tails, and flexing their wings oddly. Then, leaping from the ground, they flew about fifteen feet into the air, drifting to the ground on quivering wings, as they gave forth a peculiar gobbling cry, which might be written *cut-ah-cut-ah-crah-oh*. I had difficulty getting near these birds. At about 6:30 o'clock in the evening I frightened them from their feeding. They alighted about a quarter of a mile away. Upon coming up to them again, I found them all busily engaged in digging out their roosting-places for the night. Though they had had scarcely five minutes for their work, most of them had practically finished their excavating.

During mid-May several small flocks were seen and much crowing of the courting males was heard. On May 16 Mr. Ford shot two specimens, a male, weighing 1 lb. 10 oz., with brown plumage coming in all over the head and neck, and a female, weighing 1 lb. 4 oz. The gonads in both these specimens were somewhat enlarged.

On May 19 Tommy Bruce and I encountered a lone female in the middle of the big prairie west of Itiujuaik. This bird had considerable brown blotching on the head and neck, and a few dark feathers among the scapulars and tertials. She was feeding on willow, and her crop was packed with tiny green leaves.

On May 26 a flock of seven were seen near the Post. All these had a good deal of brown on the head and neck. On May 28 Father Thibert killed three near Seal Point, two females and a male. The head and neck of the male were entirely brown. On June 4 I secured a male (not fat) with handsome big combs, almost solid brown head and neck, and much worn body-plumage, a perfect example of the male in mating-plumage. The gonads were much enlarged.

On June 6 Tommy Bruce found "big ptarmigan" abundant along the southern coast just north of Kikkuktowyak Island.

On June 19 and 20 not far from our camp at Prairie Point I heard one cackling and crowing several times, but never actually saw it. It must have been nesting. In the vicinity of the Post I did not see a single White-shafted Ptarmigan after June 4. This absence of the birds may have been due partly to their having been killed by the Eskimos, but I think

it was principally because the ecological conditions there do not altogether satisfy their nesting requirements.

During the summer of 1930, the species was reported to be abundant just inland from Munnimunek Point, where single male birds were seen repeatedly by the Eskimos. Tommy Bruce also saw it at Cape Kendall, but did not find a nest. To the best of my knowledge no nest was found by anyone during my sojourn on the Island.

Many nests had been found in former years, however. Amaulik recalled nests with from nine to eleven eggs, which he had found among the willow-bushes in the flat country along the Kirchhoffer River. Jack Ford had found a nest not far from the bank of Ford's Rivers at the head of South Bay. Young birds in various stages of development had been noted during latter summer in many parts of the Island.

Annual Routine: When the first heavy snows of winter bury the willows, the White-shafted Ptarmigan finds it necessary to move to some region, where it can find food. At this time the birds which nest in Melville Peninsula and in the region of Duke of York Bay probably assemble in large flocks at the head of South Bay and in the sheltered prairies of the southern parts of the Island. Family-groups probably stay together more or less during the entire winter, feeding on the willows, and roosting in neat basins which they dig for themselves in the snow. They do not, as a rule, wander widely after they have found a good feeding-ground.

By the middle of March, mating begins, and the pairs gradually separate from the flocks as the northward migration progresses. Mating begins a little in advance of the appearance of the brown plumage on the head and neck of the male, its first manifestation being an expansion of the red combs above the eyes. The pre-nuptial moult begins early in May. This moult apparently involves only the region of the head and neck in the male, but is more general in the female. According to the Eskimos the nest is situated in the open, in grass, or among the willows, often not far from a stream. One egg is laid daily, once the set is begun. Only the female incubates. By the time the young are hatched, the male has lost the white plumage which is held throughout the egg-laying period. As to the late summer-plumages of the species I cannot say, since I saw no individuals in this plumage.

The food of the White-shafted Ptarmigan during winter and spring is almost exclusively the twigs, buds, and bark of willows. As summer advances, insects are doubtless added, and in late summer and fall, or whenever available, seeds, grasses, roots, and berries are consumed. The principal natural enemy of the species is the Arctic Fox, which captures many partridges, especially during the period of migration. The weasel, Arctic Wolf, and Snowy Owl also prey upon ptarmigan to some extent, and the White Gyrfalcon may live almost exclusively upon the plump birds, if it finds a plentiful supply of them. Foxes and ravens eat the eggs when they find them, no doubt. The Eskimos may shoot them and snare them in winter, but they do not depend upon them as food, unless larger game-animals are very scarce.

Fleshy Parts: The eyes of all specimens examined were dark brown, black at a distance. The bills of both males and females were dull bluish gray with a horn-colored tip on the upper mandible. The bill is thus different from that of the Rock Ptarmigan, which is black. The comb above the eye in winter specimens is coral vermillion; this comb becomes much brighter and larger as spring advances. The eyelids are dull blue-gray. The claws are pale horn-color, whitish straw-color, or grayish white.

Other Records: As stated in the General Introduction to the present volume, ptarmigan or "partridges" are mentioned by most of the early travellers in this region. It is usually not

evident, however, which species of "partridge" is referred to, and it is probably wrong to assume that both *lagopus* and *rupestris* have been encountered with equal frequency, since the range of the present form may not be continuous along the west coast of Hudson Bay or, indeed, anywhere in this region.

Rae apparently did not take a specimen of the present species in the Repulse Bay country, though he does definitely refer to *rupestris*. "Under *Lagopus albus*, Kumlien (1879, pp. 82-83) includes this species in his list of Cumberland Sound birds. Writing of *L. rupestris* he states that he secured two specimens of the willow ptarmigan while in Cumberland sound."¹⁷ Preble (1902, p. 103) found *Lagopus lagopus*¹⁸ "rather common on the Barren Grounds south of Cape Eskimo August 3 to 13, where two immature specimens were secured." Neither Eifrig (1905) nor Low (1906) even lists the species. Mr. Ford told me of seeing these large ptarmigan in the fall and winter both on Southampton and Coats Islands, but he regarded them as very irregular, and never actually found a nest himself.

Soper (1928, p. 104) says: "Though the present writer collected a large series of ptarmigan from many, widely separated localities on Baffin Island, not a single one of this species was taken." During 1929, however, Soper found this species along the western coast of the island, and Mr. Taverner has kindly sent me for comparison some of the specimens he collected at Camp Kungovik. Mr. Swaffield did not preserve a specimen from Mansel Island, although it is likely he found it there in winter. Mathiassen (1931, p. 28) says: "On the whole journey across the island during the month of October we saw only three ptarmigan. . ." There is no way of telling which species Mathiassen actually saw, for he identifies them as *Lagopus mutus*, a European species.

We did not see individuals of any form of *Lagopus lagopus* anywhere in the Chesterfield Inlet region during the late summer of 1930, though we found *rupestris* rather common thereabouts (Sutton, 1931c, p. 157).

Lagopus mutus (Montin). ALPINE PTARMIGAN.

This palearctic form, which may, as Hartert (1921, p. 1871) and Swarth (Report on Birds of Atlin, British Columbia, University of California Publications in Zoölogy, Vol. XXX, p. 100) have suggested, be conspecific with *rupestris*, is not included in the Check-List of North American Birds (1931). Mathiassen, however, possibly not realizing that *mutus* is restricted to Europe, identifies the ptarmigan he encountered during the fall of 1922 as of this species. He says (1931, p. 28): "On the whole journey across the island during the month of October we saw only three ptarmigan (*Lagopus mutus*)."¹⁹ There is no way of determining from this statement what species of ptarmigan was actually seen, since it is not apparent that Mathiassen was aware of the differences between *Lagopus lagopus* and *Lagopus rupestris*, the only species which are at present known to occur on the Island.

19. *Lagopus rupestris rupestris* (Gmelin). ROCK PTARMIGAN.

(Plate XIV, figs. 1, 2; Plate XXIII, fig. 1)

Eskimo Name: According to Amaulik Audlanat and Mr. Ford, the Aivilikmiut name for the Rock Ptarmigan is slightly different from that of the Willow Ptarmigan, the former being known as *Ahigitiuuk*, the latter as *Ahigivik*. Obviously these words are basically the same: proof that the Eskimos recognize the similarity of the two species. What the root

¹⁷Quotation from Soper, 1928, p. 104.

¹⁸It is likely that the birds Preble encountered were *Lagopus lagopus albus* (Gmelin), and not the present form, which is more northerly in distribution in summer.

Ahigek means, I cannot say; I think it is not onomatopoeic. Hantzsch (1929, pp. 12 and 13) gives *Akkigervek* as the name of the Willow Ptarmigan, and *Niksártok* (meaning *to cough up*, an onomatopoeic word) as the name of the Rock Ptarmigan among the Eskimos of northeastern Labrador. I heard no such word as *Niksártok* on Southampton.

Status: In the high eastern part of Southampton the Rock Ptarmigan is found the year round. In the western part it is found as a rule only in the winter. It is not sedentary anywhere on the Island, though it is perhaps less distinctly migratory than the White-shafted Ptarmigan. At the head of South Bay many pairs were seen in the spring, but these were nearly all killed by the Eskimos, so very few birds were seen there in midsummer. The natives told me they had seen ptarmigan (species uncertain) flying southward across Frozen Strait in the fall, during previous years.

Fall Records: During the first few weeks of my field-work about the Post, I saw no Rock Ptarmigan. I was especially eager to collect some males in what has been called the late summer-plumage, so hunted them near and far. Finally, on September 14, along the highest part of Poorhouse Hill, in a pretty, moss-lined ravine among gigantic boulders, I came upon a family-group of eleven birds, eight of which I collected. Among these was the adult male; but all the birds were moulting, and all were already largely white. They were exceedingly tame, both young and old, and they looked at me stupidly, flicking their tails, craning their necks, and giving faint, turkey-like cheeps, as I walked after them. When I shot some of them the others looked at their dead companions with a curious expression. None was fat; all were in good condition, however, and their crops and gizzards were full of small, green berries, which they had been gathering from the hillside.

The species was not recorded again until October 1, on which date I collected two almost immaculate white females, which I think were young. Both were rather fat, and the crops contained green, ripe, and decayed berries, as well as buds and leaves of various sorts. The tail of one of these birds is noteworthy in that the rectrices on one side are full-grown, while on the other side they are just appearing from their sheaths.

On October 2 there was a noticeable invasion of Rock Ptarmigan in the vicinity of the Post. Keetlapik shot seven birds, all virtually pure white, and Jack Ford and I took a female, which had a few dark feathers in its plumage. We found also the remains of a bird, which had just been captured by an Arctic Fox. On October 4 I collected three specimens (two males and a female) in which the moult was practically complete.

On October 6 we had a severe gale and much snow. After this storm, Rock Ptarmigan became abundant everywhere. On October 7 a large flock of pure white birds were seen at Poorhouse Hill. Their call-notes were a high, thin whine, a burring, sputtering rattle, and a sharp cackle. The birds were feeding on willow-twigs and such berries as they could find among the rocks. On October 10 a solitary male with a good deal of gray in the plumage was seen at Seal Point. It was so unsuspecting that I could not make it fly. Finally it walked out upon the very thin ice in a small lake, and when it began to sink into the water took alarm, burst into loud cackling, and whirled away.

On October 17 about three hundred birds were seen at the head of South Bay. Five were shot, including one female, which had no black streak through the eye. On October 19 Keetlapik shot four pure white birds. On the same date I saw a large flock at Seal Point. When first seen, these birds were resting; but they suddenly rose high in air and headed for the other side of the bay, seven miles away. There was a good deal of ice on the bay at this time, but they apparently did not stop on the way across. On October 21 Father Thibert got nine birds. Of these three birds (all females) had no black line through the

eye. I saw about two hundred birds on this date, and upon cursory inspection estimated that about one out of three females had no black loreal streak.

The ptarmigans usually fed in the open country between the ridges. They ran about in loose companies, nipping off the willow-twigs, preening their plumage, or standing quietly, as if carved out of snow. Their plumage had an exquisite pinkish cast, which was especially noticeable when they stood in front of a blue shadow on the snow. They seemingly paid little attention to the weather, running about in the drifting snow, heading into the gale, or dodging about among the gusts, their feathers ruffled by the wind. The black tails never showed while the birds were feeding; but when they rocketed away, the black fans spread with startling suddenness.

Winter Records: After the end of October I did not see any flocks of Rock Ptarmigan which I thought to be migrating southward. The birds wandered a good deal from one feeding-ground to another, and sometimes flew across considerable stretches of ice. They were seen irregularly throughout the winter in all parts of the Island, though we did not note a single individual in the region of East Bay during our sojourn there from November 22 to December 3.

During some winters this species and the White-shafted Ptarmigan are exceedingly abundant. Mr. Ford remembers one year (probably the winter of 1924-25) when hundreds were seen virtually every day throughout the entire season, and when it was not difficult to go out with a gun for a few minutes and bring back several dozen birds.

On November 4, 1929, a large flock came near the Post at about noon. Since the weather was good I went out with the motion-picture camera and tried to get some photographs. The birds were not wild, but they trotted about so ceaselessly that I could not get more than two or three birds in the field at once, and after half an hour's walking returned with hands half frozen.

On fine days flocks frequently came near the buildings at the Post, where the Eskimo children pursued them with bows and arrows, stones, and other weapons, sometimes killing one.

Like the White-shafted Ptarmigans, the Rock Ptarmigans dug neat beds in the snow, in which to spend the night. They were, as a rule, amazingly tame, but sometimes were unaccountably wild and would rush off at the merest hint of danger, flying a few feet above the ground, following little valleys among the ridges, mounting over the crests, turning and twisting from side to side, the broad, black tails in odd contrast against the white background. The Eskimos believed the birds to be wilder on clear days when there was no wind; I found them, however, to be sometimes tame on such days, and sometimes very wild on quiet days. Older birds probably are more suspicious. I noted also that so long as I kept myself between the birds and the sun they paid little attention to me, perhaps thinking me a caribou, but that when I let them get between me and the sun they began at once to look on me with suspicion.

The winter-food of the birds was largely willow-twigs and buds, though I noted that they ate almost any sort of green stuff they could find, and of course they swallowed a good deal of gravel. They fed at any time of the day, though perhaps more energetically early in the morning.

Spring Records: The first evidence of any courting among these ptarmigan was noted on March 24, 1930, when several birds were watched as they ran about with tails slightly lifted, cackling loudly. On March 28 I observed a single male bird running about excitedly, as if it might be defending a nesting-ground, lifting and shaking its tail, and calling *kuk-*

a-krah-oh in a harsh, rattling voice. It was perfectly white, and the combs above the eyes seemed no brighter to me than in winter birds. On March 31 Angoti-Marik shot four birds, which were to all outward appearances white, but on whose heads new pin-feathers were growing.

During April I noted that the birds seemed to be going about singly, in pairs, or in small groups more than they had during the dead of winter. On April 28 Kyakjuak and Pumyook saw several birds in the high country bordering Fox Channel, which appeared to be mated, though in perfectly white plumage.

By the middle of May the females began to take on the gray and brown of the summer-plumage. On May 20 a flock of about sixty were seen at the base of Itiujuak. Many of these had small patches of dark feathers on the head and neck. Of four specimens that were shot, two males and two females, only one had any noticeable dark spotting in the plumage; this bird, one of the females, had a few dark feathers on the forehead and auricular region. The gonads of all the specimens were somewhat enlarged, though the combs above the eyes seemed to me no brighter than in birds taken in mid-winter.

On May 21 the whole of the South Bay region was visited by a terrific gale, the worst I ever saw in the North Country. I was able to walk in safety along the sheltered base of the cliff near our camp at Itiujuak, though the wind shrieked wildly and the snow curled in sheets over the precipice above me. During the course of my walk I suddenly came upon a large flock of Rock Ptarmigans, huddled cozily among some of the sheltered boulders. Though I walked almost among them, they would not fly. When I shot, the flock rose with a good deal of cackling, mounted almost directly upward toward the crest of the cliff, and then, meeting the savage gust of wind, were suddenly hurled skyward and out of sight in the swirling snow. Of the four specimens secured three were males, one a female. The female had some dark plumage on the head and neck, and in one of the males three small proximal wing-coverts and a feather or two in the rump were brown. The other two males were pure white. The gonads of all these birds appeared to be somewhat enlarged.

On May 23 while returning to the Post from Itiujuak, we came across three Rock Ptarmigans, feeding upon willow-bushes in an open plain. All these birds were females, and all had considerable brown in the plumage. The gonads were somewhat enlarged.

On June 5 a solitary female, much mottled in appearance, was seen feeding in the partly snow-covered tundra along the western slope of a ridge about four miles north of the Post. On the following day two females, one largely brown, were shot by some Eskimo lads near the Post. On June 7 Santiana saw a female bird, which was more brown than white, and which flushed underfoot. By this time, the snow had practically disappeared.

On June 8 I saw a handsome mated pair at the head of the Bay. These birds were walking about at the edge of a snow bank, deliberately seeking food among the dead grass, lichens, and tiny pools of water. The male was pure white; he had not even begun the moult into his summer-plumage. But it was evident even at a distance, that his feathers were frayed. He walked about with neck held stiffly. His black tail was spread and lifted, and he took short, arrogant steps as he looked at me intently, lifted his gorgeous, flowered combs, and rattled and cackled. When I approached, he did not withdraw, but came toward me as if intent upon giving battle. The female, which peeped a little now and then in a soft voice, walked about slowly, with neck craned high, flicking her tail quietly, looking now this way now that, and finally wandering off by herself to resume her feeding. She was in virtually perfect summer-plumage. I observed the male bird some time before I saw the female. As I left the place, hoping to return later to find a nest, the male sprang into the air

on quickly beating wings, rose to a height of about twenty feet, and gave forth an odd, loud, gobbling cackle, as he descended to the ground.

These courtship antics were heard almost daily from this time on. So far as I could see, the queer cacklings and flights served no other purpose as a rule than to charm the females. That is, there seemed to be no other male birds at hand whom the performers were threatening to combat. On June 10, however, I saw two males performing before one female, and there was considerable battling and chasing. I watched the birds for fully half an hour. After one male finally drove his rival away he returned to his mate panting heavily from the exertion.

On June 11 I found the remains of six birds near the entrance to an Arctic Fox burrow. On the same date I located several mated pairs, none of which I attempted to collect, since I was eager to find a nest somewhere near the Post and to collect late summer specimens. This failure to shoot specimens proved to be unwise, for though I pleaded with the Eskimos to preserve the birds which were near at hand so that I could watch them, all were killed pair by pair, until not one was left nearer than Poorhouse Hill, or the high land just east of the Koodloutok River. During mid-June I saw solitary, pure-white male birds several times, and believe that their mates very likely were sitting on their nests. On June 19 Father Fafard shot a pair in which the female was perfectly brown, and the dirty, much frayed, white male, was *just beginning* to moult into summer-plumage. There were a few new, dark feathers on the crown. The oviduct of the female held a fully formed egg. The middle of her belly was well feathered, but along either side of this feathered median tract were considerable, absolutely bare incubating patches. I am sure this bird had already laid part of her set of eggs. We all went to the spot where the bird had been killed and after a long search actually found the nest, but of course the eggs had by this time been destroyed. The nest, a mere depression in the tundra, was situated about forty feet from the edge of a large lake, in a somewhat sheltered spot at the base of a low, rocky ridge. The lining was composed altogether of bits of leaves and grasses, which had been gathered close by, and a few feathers from the belly of the female.

On June 25 I observed a male in white, worn plumage, at Poorhouse Hill. There was a little brown on the head. I think the female must have been on her nest somewhere close by.

On July 4 I watched a male bird continuously for almost three hours, hoping I could find the nest. Most of the time this bird, which had a few brown feathers on the head and neck, and which was much soiled in appearance, simply sat about watching me. It walked deliberately across open spaces between the crests of ridges, taking up one observation post for a time, then going to another. By following it about, I located several cozy dusting places where there were many feathers of the female bird, and found places along the margin of a little lake where the pair evidently went to drink or to bathe, but saw no sign of the female bird, or of the nest. The male cackled loudly when I approached it too closely, sometimes flying up as if starting to give one of its courtship shows, but for the most part being inactive and silent. During the course of the three hours I watched this bird, it once flew out into the middle of a lake to a small islet. Here it was attacked by a pair of Parasitic Jaegers which dived about, screaming loudly, but evidently did not intend to kill it. Finally it came back to shore and fell to eating willow-twigs and leaves, nipping off the shoots with a peculiar, quickly repeated, jerking movement of the head.

On July 11 to my great surprise, I found a mated pair not far from the Post. Fairly desperate in my eagerness to find a nest, I sat down where I was, sent my Eskimo companion in for food, and decided to watch the birds until they should lead me to the eggs. I watched

them for seven hours continuously, followed them over about three miles of ridge and tundra, and finally decided that they had no nest. The male was practically pure white, the female solid brown. The female always took the lead, the male following and staying closer to me. Much of the time I could not keep the female in sight because she was so protectively colored. When in the open, the white of her wings could be seen rather easily, but the rest of the time, especially when she was among the willows, I could hardly see her. The birds took long naps; they fed hastily three or four times, and the female took a dust-bath, rolling over almost onto her back as she shook the dust into her plumage in the manner of a barnyard fowl. I collected the female bird (the only female in full summer-plumage I secured), at about seven o'clock in the evening. The region of the belly was bare at either side of the median feathered tract. I think the bird had lost her first set of eggs and was, perhaps, preparing to lay a second set.

I was greatly disappointed at my failure to get a good series of males in the late summer plumage. As a matter of fact I never even saw such a specimen at Southampton. The moult from the worn white plumage must be very rapid, for the July males which I saw were sadly in need of new feathers. The retention of the winter-feathers by the male through most of the summer, while the female is wearing brown plumage assumed at the beginning of the season, is interesting indeed. The purpose is, perhaps, doubly protective. While the female becomes more inconspicuous at the time of her nesting and as a result can hardly be seen by her enemies, the male becomes more conspicuous and thereby can attract the attention of passing enemies in such a way as to give the female every chance to remain with her eggs, even though he himself be killed.

It is exceedingly unfortunate that I did not preserve the male specimen collected on May 21, in which a few brown feathers were appearing among the white, for this one instance of a male bird's moulting into brown plumage in early spring leads one into an exceedingly interesting speculation upon the various plumages of this species.

It was evident from the appearance of this specimen that *some* male Rock Ptarmigan become brown early in the summer at the same time the females become brown. Experience leads me to affirm, however, that adult, breeding males *never* become brown until after the middle of the summer, usually not until mid-July or early August. It seems logical to suppose, therefore, that these males which turn brown early in spring are immature, perhaps non-breeding birds, which are responsible for the so-called "early summer plumage" of the species; and that the fully adult males, which never moult until late summer and which assume at that time a "pepper and salt" or "finely vermiculated" plumage are responsible for what has been called the "late summer" or "autumn" plumage, and that in reality there is no such thing as a mid-summer moult from this "early summer" to the "late summer" plumage.

In spite of the fact that I looked carefully over all the ridges near the Post, I think I must have missed one nesting pair whose pretty young nonchalantly stepped into the path between the Post buildings one morning in August, while I was packing my collection for shipment. Two of these half-grown young were killed by the Eskimo children. One was captured alive, sketched and photographed, then released. The bird was not in the least wild upon being brought into the house. It walked about on the floor craning its neck toward the windows, and scarcely objecting even to being picked up in the hand. I did not see a downy young.

Annual Routine: With the coming of winter, the family-groups of Rock Ptarmigan band together, often forming immense flocks. They then seek a good feeding-ground where they

may spend the winter. This often leads to a considerable migration to the southward. When they have found a place, where the snow is not deep enough to bury all the willow-bushes, they establish themselves for the season, digging little individual beds in the snow for themselves each night, basking in the sunlight if the day be bright, feeding many times a day so as to keep themselves in good condition, and seeking the shelter of a ridge when the weather becomes stormy.

Even as early as March they begin to mate. Gradually the red combs above the eyes of the males swell and expand, and the white winter plumage of the females is replaced by the gray and brown of summer. During courtship a good deal of sparring goes on among the males, while the flocks are together, but the pairs soon wander off by themselves, leaving the unmated birds in small bands.

The adult male retains his white plumage until mid-summer, presumably until the female has laid her full set of eggs.

The birds are very quiet during summer, the males sometimes giving their courting performances a few times in the morning and evening, especially when the weather is fine, but remaining silent for the rest of the day.

The Eskimos told me that nests of the Rock Ptarmigan usually hold from seven to thirteen eggs, that only the females incubate, that the old birds may be very savage in defense of the young, and that nests are usually situated in high, rocky places, not in the meadows, as are nests of the White-shafted Ptarmigan.

The moult of the males, females and young into winter-plumage takes place at about the same time in the fall. The moult is usually fairly well completed by the end of September. Family-groups probably stay together more or less throughout the fall and winter.

Ptarmigans have many enemies. Living as they do the year round in the Arctic, they are preyed upon summer and winter by the Arctic Fox, Snowy Owl, and the weasel. Occasionally they are caught by the White Gyrfalcon, and perhaps less frequently by the Duck Hawk. I think it hardly likely that gulls and jaegers prey extensively upon the eggs or small young, since the ptarmigans usually nest inland, and the birds are protectively colored. The Eskimos kill a good many, especially when other food is scarce, the greatest damage being done in the spring, when mated pairs are killed.

Fleshy Parts: The bill of the Rock Ptarmigan differs from that of the White-shafted Ptarmigan in that it lacks the horn-colored tip and is solid, glossy black. The eye is dull brown, almost black in appearance at a distance, especially when the birds are in white plumage. The claws are gray-black, light gray, or pale horn-color. The region just above the eye is devoid of feathers in both sexes and is occupied by a sort of comb, which is very small in the female, considerably larger and more noticeable in the male in winter, and decidedly large and noticeable in the male in spring. This naked area and the comb is very delicate pink or orange-pink in young birds. In the adult female it is little brighter. In males in winter, it is usually dull vermilion, sometimes scarlet, and it is usually completely covered by the long feathers of the crown. In the spring the combs in the male expand amazingly, become a gorgeous geranium-red, and may be lifted high over the head in a very imposing way. The eyelids proper are dull greenish gray.

Other Records: There are many references to "partridges," "White partridges," or "ptarmigan" in the writings of the early explorers, but it is practically never possible to determine to which of the two species these references allude. One of the earliest definite references to the present form is made by Rae (1850, p. 29) who encountered a "hen partridge (*tetrao rupestris*) and her brood" on July 15, 1846, at Cape Fullerton. His narrative con-

tinues: "I have seen many birds attempt to defend their young, but never witnessed one so devotedly brave as this mother; she ran about us, over and between our feet, striking at our hands when we attempted to take hold of her young, so that she herself was easily made prisoner." Rae evidently took the species at Repulse Bay also, since specimens from that region are accredited to him in the British Museum Catalogue of Birds.

Preble (1902, p. 104) did not find the species in the vicinity of Cape Eskimo, "as its summer home lies to the north of the region visited." Eifrig (1905, p. 239) says: "Fairly common as far north as the willow, dwarfed at last to a height of only six inches, is met with. They build their nests of grasses, etc., lined with finer grasses and some of their own feathers. The usual complement is 8-10 eggs." Low (1906, p. 318) makes an interesting comment on the migratory habits of the species at Chesterfield. He says: "The Rock Ptarmigan is found throughout the year at Fullerton, but only in small numbers during the winter, the main body migrating southward early in October. Thousands at that date were seen crossing Chesterfield Inlet, in flocks numbering up to several hundreds. They return from the south in May, usually in pairs or in small flocks."

Mathiassen (1931, p. 28) says: "On the whole journey across the island during the month of October we saw only three ptarmigan. . ." I do not know which species these were. Mr. Ford found the Rock Ptarmigan common during his first winter on the Island, but regarded it as rare during summer, and never found a nest. At Coats Island he saw it frequently in winter, but only rarely in summer. Soper (1928, pp. 104-6) gives us several records from Baffin Island, where it is apparently not very common. Mr. Swaffield did not take a specimen during 1929-30 at Mansel Island. We found it common at Chesterfield during the late summer of 1930, and took several specimens from family groups seen there not far from the Post (Sutton, 1931c, p. 157).

Lagopus rupestris kelloggæ Grinnell. KELLOGG'S PTARMIGAN.

According to the Committee of the American Ornithologists' Union (1931, p. 84) the summer range of this subspecies includes "the Arctic Islands (except Baffin Island), and northwestern Greenland." I failed to procure a good series of summer Rock Ptarmigans from Southampton, but a comparison of the few specimens taken with a series of *kelloggæ* from Alaska shows them at once to be *rupestris*. If the summer range of *kelloggæ* does, indeed, include northwestern Greenland, it is possible that this form moves southward in winter throughout this general region, but subspecific identification of winter specimens is, apparently, next to impossible. The points at which *kelloggæ* has been found nearest to Southampton are, according to Swarth's map (Report on a Collection of Birds and Mammals from the Atlin region, Northern British Columbia, University of California Publications in Zoölogy, Vol. XXX, p. 97) considerably to the west of the Island.

Order GRUIFORMES.

Family GRUIDÆ.

Genus GRUS Pallas.

20. *Grus canadensis canadensis* (Linnaeus). LITTLE BROWN CRANE.

Eskimo Name: Both Aivilikmiut and Okomiut called the Little Brown Crane *Tutteeqhuk*, or *Tetteqhuk*. All the natives were familiar with the tall bird and had but to elaborate its native name a little, in imitating quite successfully its "tin-panny," trumpeting cry. The same word was used along the west coast of Hudson Bay much farther south, in the vicinity of Nunalla, for the Whooping Crane, *Grus americana* (Linnaeus), (Sutton, 1931c, p. 157). Mr. Brandt tells me that in Alaska the bird is called *Co-chee-shluck*.

Status: A rather rare, but widely distributed summer resident, which is decidedly commoner in the flat, grassy tundra of the Cape Low region, than in the rocky eastern part. It is one of the few species which may be found far inland, as well as in the coastal lake-region. It arrives and begins nesting early in spring; and it may linger late in the fall. Near the Post it occurred in three places: at the head of Coral Inlet, at Prairie Point, and along the Koodloutok River.

Fall Records: On August 19, 1929, some Okomiut natives brought me the skin of a fully grown, but poorly feathered specimen (sex uncertain), which had been killed about four miles southwest of the Post on about August 12, as it flew above a boat-load of seal-hunters. The tibial bones had been removed completely, and the head had not been skinned out. The somewhat sunken eyes were of an orange-straw color. The naked skin of the head was dull red. The specimen had been crudely, but generously, stuffed with grass after the skin had been smoked and partly dried. I had a good deal of trouble re-making it into a useable specimen.

At Four Rivers on the evening of August 27, I saw at a distance a handsome pair of Little Brown Cranes. I had walked quite a way inland from the sandy beach, where our motor-boat was propped up for the night, and had passed shallow, gravel-bottomed rivers, low ridges, and wide, grass-fringed lakes, in making my way inland toward the distant, indistinct mound, which the Eskimos had called *Noovoodlik*. The day was about done and the wide tundra had a shadowy, foggy appearance. A strange, almost melancholy note drifted across the gray-green expanse. Far in the distance I saw two gaunt birds, which appeared in the gathering dusk as tall as ostriches. Cranes! They walked slowly back and forth. With my glass I could see them lift a foot, then put it down measuredly, and take another step. They looked at me with one eye, then with the other. While I was yet fully a quarter of a mile away they crouched, leaped into the air, and made off, their broad, square-tipped wings beating slowly, almost awkwardly, as their trumpeting became more fervent. I did not see them again that night, but heard them once more in the morning.

On August 29 at Hut Point, I saw a pair and their two fully fledged young feeding along the bank of a small stream not far from shore. I had a chance to observe these birds for some time, for I crept up to them from behind the remains of a stone fox-trap, which Eskimos had built there years before. The birds fed together, but the parents kept their heads up all the time while I was nearby. Finally they all flew away with much trumpeting. So far as I could see, the young flew quite as ably as the parents.

On September 1 a pair were noted near Ranger River; on September 2 two exceedingly wary pairs were seen at Cape Low. On September 3 I became a trifle insane over not getting a specimen of this fine species, so attempted a memorable trans-tundra stalk after a pair which were feeding along a marsh.

I ran to the shelter of a low gravel-ridge, dropped to my knees, tied my gun to my shoulders, and began creeping across the prairie. I wriggled across gravel-ridges, got wet from shoulders to feet going through lakes, pushed through the grass, and finally came to perceive that, toil onward as I might, the cranes could out-distance me at that rate; and they progressed far more gracefully than I. When I stood up, cramped and cold, after my quarter-of-a-mile expedition, the cranes, quite as far away as they had been at the start, rose from the ground and flapped down the coast, not even deigning to circle over me.

On September 5 at Four Rivers I had another chase after cranes. I saw four birds. Two of them were less suspicious than the others. These I decided to pursue. I waded out into a marsh (the deepest I encountered anywhere on Southampton) and when the

water got waist deep the mud was so sticky and deep that I could scarcely progress. I was finally forced to retreat. These birds, which I saw to good advantage, appeared to be very gray.

No crane was seen after September 5, during the fall of 1929.

Spring Records: Amaulik Audlanat and Kyakjuak saw two Little Brown Cranes, probably a mated pair, flying high toward Munnimunnek Point on June 1, 1930. These birds had evidently been feeding on one of the bare-topped gravel-ridges at Itiuachuk. On June 2 Tommy Bruce saw twelve newly arrived birds in the region of Cape Low. All appeared to be mated. He had little difficulty in shooting two specimens with his rifle. These he brought back to the Post on July 9.

On June 7 he found a nest containing one egg. He had no opportunity to visit this nest again to determine when the second egg was laid. Patches of snow were still to be seen on the Cape Low tundra at this time.

On June 6 Noah saw a pair near the mouth of the Koodloutok River. He thought the birds had a nest even at that early date.

On June 9 I saw a pair on the high plateau of Itiuachuk, but could not get anywhere near them. A solitary individual was seen near the Post on the same date.

On June 10 I heard two inland from the Post, and on June 11 saw a solitary bird flying low over the tundra not far from Seal Point. The legs, though stuck out straight behind the bird, looked decidedly thick and stumpy.

On June 13 Jack Ford noted three mated pairs in the region to the west of Itiujuak. He did not note any courtship antics.

On June 18 I saw three at Itiuachuk; two of these were obviously mated; the other seemed to be a solitary bird. This last one was relatively tame and with the glass we could watch it as it fed near a small lake not far from our little tent.

On June 23 I watched one for some time at Prairie Point. It was being scolded and besieged by a pair of Parasitic Jaegers. As the jaegers dived, the crane ducked its head again and again. Since various authors mention lemmings among the items of food eaten by this species, it may be that they occasionally devour the young of various smaller birds, which they happen upon in the course of their wanderings over the prairies, and that, in the present case, the jaeger nest had been threatened. On June 25 I saw two pairs in the Prairie Point region, but did not succeed in getting anywhere near them.

On July 2 Keetlapik found a nest at the head of South Bay, about ten miles east of the Post. He flushed the incubating parent (the male) from the nest, shot it at close range, and collected the one egg, which upon preparation, proved to be at the point of hatching. The nest was low and flat, being about four feet in diameter (outside measurements) and about seven inches high. It was made of moss, grass, and small twigs, and was situated in the middle of a wide, low meadow, not far from a low stand of willow-bushes.

The bird had been sitting on the nest with its neck extended and stretched out in front of the body. When it jumped from the nest it flopped along awkwardly, feigning injury. That it had been shot at very close range was evidenced by the fact that the skull was shattered by shot.

Though there was but one egg in the nest, there were two distinct bare areas upon the belly of the male. It occurs to me now, in the event that the eggs are not deposited on consecutive days, one egg may hatch sooner than the other, and that therefore, in the present case, one young had hatched and was, at the time Keetlapik found the nest, abroad with the female parent. Keetlapik did not remember seeing another crane, to be sure, but these

great birds range widely. Keetlapik realized, by the way, that I would be disappointed with but one egg, since the full clutch was known to be two. So he informed me, at the time he gave me the specimens, that the other egg had not yet been laid. Pointing to the bird's belly, he said "See, you can feel the other egg inside the body." Under the circumstances, we all agreed that a gizzard has a perfect right to assume the role of an unlaidd egg, if it will make everyone feel better for the time being.

The stomach contained much small gravel and some bits of pale green grass-shoots. The bird was exceedingly fat; and the flesh, when cooked, was delicious.

Annual Routine: The Little Brown Crane returns in spring and nests early. Many of the birds may be mated by the time they arrive, but, nevertheless, courtship dances are sometimes seen by the Eskimos. The nest is built on the open tundra, usually in low country. The eggs nearly always number two. The young remain with their parents until the family-groups migrate southward in September.

Fleshy Parts: A field-sketch was made of the head of the specimen shot on July 2, within four hours after the death of the bird. The following description of the fleshy parts of the head is based upon Ridgway's *Color Standards and Nomenclature* (1912): bare space of crown, loreal, and orbital region of varying shades of red or red-orange, *orange-rufous*, *bitter-sweet pink*, and *begonia-rose*, fading anteriorly into the *drab gray* or *grayish olive* base of the upper mandible, through *light purplish gray* and *light grayish blue-violet* toward the tip, with suffusions near the nostrils of *light russet vinaceous*; under mandible *drab gray* at the base, fading into *grayish olive* and *pale glass-green* toward the tip; eye *cadmium-orange* in a narrow ring about the pupil, merging quickly into bright *grenadine red*. Unfortunately I did not make a sketch of the legs and feet. I never saw a downy young bird.

Other Records: Richardson (1825, p. 353) records this species from Igloodik, Melville Peninsula. Rae apparently did not take it at Repulse Bay, since no specimen is accredited to him in the British Museum Catalogue of Birds. Kumlien (1879, p. 88) found it on Baffin Island. Eifrig (1905, p. 238) states that "a bird of the year was taken [by Low] in Southampton in July, 1904" and that "no more were seen." Low, on the contrary (1906, p. 317) says: "Several pairs seen on Southampton Island. Breeds there. Skins from Southampton." Bent (1926, p. 239) includes "Southampton and near Cape Eskimo" in the breeding range. Captain Murray told me he saw cranes in the Cape Low region when he first went there. Mr. Ford saw them on Southampton when he first went there in 1924, and also at Coats Island, where he knew them as "turkeys." Soper (1928, p. 96) did not see the species on Baffin Island, but calls attention to Kumlien's (1879, p. 88) records. According to Lloyd (1922, p. 50) Munn found cranes "common on Southampton Island."

The Eskimos at Southampton were all familiar with the long-legged *Tutteegehuk*. Angoti-Marik told me of seeing their weird courtship dancing. Amaulik Audlanat remembered having found two nests, each with two eggs, at Cape Low.

Family RALLIDÆ.

Genus CREX Bechstein.

Crex crex (Linnæus). CORN CRAKE.

Mr. Taverner tells me that Mr. J. Dewey Soper took a specimen (Canadian National Museum No. 23561) of this European species at Cape Dorset, Baffin Island, on September 24, 1928. This record has not heretofore been published, and it is owing to Mr. Taverner's courtesy in the matter that I am able to include it here. I find no other reference to the species in the literature at hand.

Order CHARADRIIFORMES.

Family CHARADRIIDÆ.

SUBFAMILY VANELLINÆ

Genus VANELLUS Brisson.

Vanellus vanellus (Linnæus). LAPWING.

A specimen of this European species, now in the Canadian National Museum (No. 22,563) was taken at Pangnirtung, Baffin Island, during October, 1926, by Mr. F. E. Heath. It was transmitted to Mr. Taverner, Curator of Ornithology at the Museum, by the Royal Canadian Mounted Police; and it is through Mr. Taverner that I am able to include the species here.

SUBFAMILY CHARADRIINÆ

Genus CHARADRIUS Linnæus.

Charadrius hiaticula hiaticula Linnæus. RINGED PLOVER.

Since this species is said to breed "in Greenland (both coasts)" and in "eastern Baffin Island, and probably Ellesmere Island" (American Ornithologists' Union, 1931, p. 103), it should appear occasionally in the region of Southampton Island. Kumlien (1879, p. 83) speaks of it as common about Cumberland Sound, Baffin Island; Bent (1929, p. 233) with some reservations includes Baffin Island in the breeding range. Soper (1928, p. 103) gives us a few records from Baffin Island, but does not agree with Kumlien as to the abundance of the species at Cumberland Sound, where, during 1924-1926 "not one example . . . was taken."

Parry (1824, p. 41) mentions *Charadrius hiaticula* from the region of Duke of York Bay, but it is probable that he confused this species with the similar *C. semipalmatus*, which is known to be widely distributed about the Island.

21. *Charadrius semipalmatus* Bonaparte. SEMIPALMATED PLOVER.

(Plate XVIII, figs. 1, 2; Plate XXII, fig. 2)

Eskimo Name: All the Southampton Eskimos called this familiar and easily recognizable bird the *Koodilikoodiliatsuk*. This word, literally translated, means *little lamp-lamp*, the *koodilik* being the well-known seal-lamp; the word should not be translated, however, for it is almost strictly onomatopoeic, the *Koodili* part being a very clever imitation of the rapidly repeated courtship cry, *atsuk* being a familiar diminutive suffix. This suffix, by the way, is not clearly pronounced, and might better be written *atkluk*; it is to be pronounced through the side teeth. According to Soper (1928, p. 102), the name in use in Baffin Island is *Kudlekaleak*. Mr. Brandt, however, tells me that the Alaskan Eskimos use the word *Wah-huey-yuk*.

Status: A rather uncommon and local summer resident, found all along the coast, perhaps less commonly in the eastern, rocky section, and definitely restricted to the gravel or sandy beaches, where it nests. I never saw the species about any of the inland lakes, even during migration. In the region of South Bay it was commonest at Seal Point.

Fall Records: On August 17, 1929, I noted a pair along one of the outer beaches near the Post. On August 19 a single bird was seen at the Post. On August 20 a small flock were heard calling at night. On this date one of the Eskimo boys killed an immature, but well feathered bird with his sling. During the remaining days of August, a few were seen near the Post, a flock of six being recorded on August 22. At Hut Point, Four Rivers, and Cape Low, we found them similarly uncommon, though a few pairs, with their young, were to be seen along suitable beaches.

On September 5 at Four Rivers, a little flock, probably a pair with their season's brood,

frequented our propped-up motor-boat. They came very close, running about stiffly with heads drawn in, bobbing a little now and then, as if in slight excitement, and thrusting their bills into the sand for some morsel of food. In feeding, they often turned their heads to one side, robin-wise, as if "listening" for some slight subterranean sound. They were fond of bathing, and would wade into water almost up to their folded tertials where they would flap and beat their wings noisily, sometimes lazily letting their partly outspread wings simply rest or float on the water while they lolled about with eyes half-closed. In drying themselves after these thorough soakings, they sometimes took funny, short flights a foot or so straight into the air.

On September 10 one was seen at the Post. On the following day, during a snowstorm, two were seen on the beach near the Factor's house.

During the entire trip to Seahorse Point, the species was recorded only twice: on September 22, when two immature females were seen and collected at Seahorse; and on the following day, when a solitary bird, also immature, was noted at the same place. One of the specimens taken had traces of natal down clinging to its chin. The birds frequented a narrow gravel-flat along a little stream not far from a broad snow-bank, which lay a rod or so back from the shore.

When we returned to the Post, no more Semipalmated Plover were to be seen. During the entire fall season, these birds were relatively silent. They ran about by themselves, or with other shore-birds of several varieties. Since the individuals seen latest in the season were young, I am inclined to think that the mature birds migrate in advance of the young. We did not observe any well-defined migratory movements of any sort during the season.

Spring Records: The little *Koodilikoodiliatsuk* is a favorite among the Eskimos, for they say that when this bird arrives, the cold winter is done at last. On June 1, 1930, Kyakjuak saw one on a gravel-mound at Bear Island. Snow covered most of the tundra on this date. On June 6 Jack Ford saw one near the Post. On June 8 I noted many performing male birds and shot one, which was in good condition, though not very fat.

I am inclined to think that the males arrived a little in advance of the females, for there seemed to be no non-performing birds anywhere prior to the twelfth of June. The females may, to be sure, also fly about recklessly, shouting "*koodili, koodili*," like the males; but the only specimens shot during this period were males; and not until June 13 did I see what I was sure were definitely mated pairs.

The courtship of this round-bodied, serious-faced little bird was performed with such vigor and such violent tempestuousness that I was sometimes impelled to laugh aloud at them. A performing bird would fly about wildly for minutes at a time, crying loudly, beating his wings stiffly, circling back and forth, zigzagging down the beach, racing out to the end of a promontory, then coming back again, repeating over and over his energetic little song, which usually began definitely enough with a few clear syllables, but winding up in a harsh blur of slurred notes, which sounded as much like a threat or burst of anger, as an expression of joy. I noted that some of these call-notes sounded like the "kree-uk, kree-uk," heard later in the season.

The courtship flights were varied with odd battles, sparrings, and pursuits, during which the birds puffed out their throats and chests, ran at each other as if intent upon a killing, or flattened themselves out comically as they waddled along the sand.

By the middle of June these noisy exhibitions were for the most part over, and the mated pairs near the Post settled down to the task of rearing their young. Various antics were noted, however, as late as mid-July. On July 8 I watched a performing bird for some time.

In cases of this sort I think either that the bird's mate had been killed and it was trying to attract another, or that the bird was immature, a late arrival, perhaps, trying to find a mate. Whether the female ever lays a second set of eggs in the event the first is destroyed, and whether, in such cases, the laying of this second set is accompanied by a repetition of the courtship of the male, is more than I can say at present.

Several pairs of Semipalmated Plover lived at Seal Point. A pair noted here on June 17 acted much as if they had eggs. One pair was noted along the limestone beaches at Prairie Point on June 19, and on the following day a nest, containing three eggs, was found. On the same date, Father Thibert found a nest with two eggs near the Post. On June 24 a nest with four eggs was found at Seal Point, but the dogs destroyed it before evening. On June 26 I collected a slightly incubated set of four eggs not far from the Post.

On June 27 two males, both of which had been incubating, were collected. Neither was fat. By this time, the plumage was so much worn that the white area back of the eye was scarcely visible in the field.

On July 7 at Koodlootok River, I collected two males and two females along a beautiful sandy beach where several pairs were nesting. All these birds had been incubating. I am inclined to think that the two sexes share these domestic duties about equally.

During early July I daily watched the nest found by Father Thibert on June 19. For a time we thought the parents had deserted, for upon several visits they did not even appear; on July 12, however, they were both in evidence, though they did not raise much disturbance. This nest was not placed on a beach, but was hollowed out of the moss on a little slope about ten rods back from the tidal line. We were in constant fear the eggs would be destroyed by dogs, so went to some pains to make our visits as inconspicuous as possible. On July 14 the young hatched and I spent some time in photographing the brooding parent.

Since this species lays an egg daily once the set is begun, the full set in this case must have been completed on June 21. If incubation began the following day, it required 23 days for the young to hatch. This period is precisely that given by Bergtold (1917, p. 90) for the Ringed Plover, *Charadrius h. hiaticula* Linnaeus, of Europe.

I collected two of the downy young, for I feared all would be eaten by the dogs. The parent (female, I think) called anxiously all the time, giving the characteristic *kerwee* cry, and bobbing stiffly between runs. She was not very tame. Once she settled to brooding, her outcry ceased; but, if alarmed, she stood up on her nest, opened her mouth as if threatening to cry out, and gave curious half-bobs as she began once more to settle down. The remaining young were gone from the nest the next morning.

On July 16 I found a nest containing two eggs at Seal Point. These were being incubated by the male; the female was several rods away brooding two sturdy young. On July 18 Eskimo children brought in two young, which they had found near the Post. Three very small young, in badly chilled condition, were found by the children on July 29.

It is odd that not once during the summer season (either in 1929 or in 1930) did I observe what I should call a migratory movement of any sort among these birds; nor was any mid-summer flocking noted. This deficiency of data on definite migration may be due chiefly to the comparative rarity of the species; or to the abnormal conditions which are forced upon it in the vicinity of the Post by Eskimos and dogs; or to the solitary, rather than gregarious, nature of the bird.

Annual Routine: The Semipalmated Plover arrives rather late in the spring, the males in advance of the females. Egg-laying begins about June 15. Both males and females incubate and brood the young. Nests are situated usually on sandy or gravelly beaches, but

sometimes on the mossy tundra. The period of incubation is about twenty-three days. Adults, usually singly, or in small flocks, migrate southward in advance of the young. Large migrant flocks are not formed.

The enemies of this species are the same as those of the other shore-birds. Gulls, jaegers, foxes, weasels, and hawks prey upon them. In the vicinity of the Eskimo encampments the native children destroy a good many nests.

Fleshy Parts: The eyes of both adult and young are very dark brown, almost black. In the downy young the eyelids are dull gray; the bill dull blue-gray; the feet and legs almost *neutral gray*, the soles pale buff yellow. In adults the bill is black at the tip, and almost *cadmium-orange* at the base; the eyelids are *picric-yellow*; the feet, at least in birds taken at the height of the breeding season, are light *cadmium-yellow*.

Other Records: Parry (1824, p. 41) probably has this bird in mind when he mentions *Charadrius hiaticula* from the region of Duke of York Bay. Rae collected a specimen at Repulse Bay, which is recorded in the British Museum Catalogue of Birds. Preble (1902, p. 101) found it "about 25 miles south of Cape Eskimo . . . August 10 to 13." Eifrig (1905, p. 239) speaks of a set of four eggs collected at Whale Point on July 1. He regards the bird as common throughout the region. Low (1906, p. 318) does not even mention the species, probably through an oversight, or because he thought the species so common as to require no special comment. Mr. Ford found it common on Coats Island. Soper (1928, p. 102) calls it "the common plover of Baffin Island." Mr. Swaffield did not take a specimen on Mansel Island, where it must surely occur. We noted it several times at Chesterfield during the fall of 1930 (Sutton, 1931c, p. 157).

Genus *PLUVIALIS* Brisson.

22. *Pluvialis dominica dominica* (Müller). AMERICAN GOLDEN PLOVER.

(Plate XVIII, fig. 3; Pl. XXII, fig. 13)

Eskimo Name: The Aivilikmiut called this bird the *Tudiliatsuk*, meaning 'little *Tudilik*,' *Tudilik* being an imitation of one of the early summer call-notes. According to Mr. Brandt, the name of the Pacific Golden Plover, *P. d. fulva* (Gmelin), in Alaska is *Too-leek-too-lear*. According to Hantzsch (Soper, 1928, p. 101) the name in use in Baffin Island is *Ungalitte*.

Status: A rather uncommon summer resident, found not so frequently along the coast, as on the barren, comparatively dry uplands. It occurs in about equal numbers both in the rugged eastern and the flat western parts of the Island, and, according to the Eskimos, in the interior and in the region of Duke of York Bay. This wide distribution of the bird during the nesting-season probably accounts for its seeming, especially in the fall, so much more common as a migrant than as a summer resident. In the vicinity of the Post it nested only near Poorhouse Hill about seven miles inland. At Prairie Point it was rare in mid-summer. Near the mouth of the Koodloutok River where the long gravel-ridges were well suited to its nesting requirements, about ten pairs nested in an area perhaps three square miles in extent. As a migrant it was especially common at Cape Low.

Fall Records: On August 19, 1929, I saw two adult Golden Plovers feeding on a gravel-ridge between two of the inland lakes. These birds had a liberal sprinkling of light-colored feathers in the black of the underparts and must have been in the post-nuptial moult.

On August 20 I shot a fat adult female from a loose flock of seven adults, which frequented the comparatively high country about six miles back of the Post. Here the dignified birds ran about on the moss-sprinkled gravel, stiffly dabbing their bills this way and that, as they fed, and springing into the air to dash away at any hint of danger. The stomach

contained considerable gravel and about thirty small, gray-colored lepidopterous larvæ of some sort, which must have been found in fairly dry country, since the birds were not feeding along the shores of the lakes, nor in the marshy areas. The call-notes given by these birds were a mellow *koo-lee* or *too-lee* which was similar to, but more abbreviated than, the equivalent cry of the Black-bellied Plover.

On August 21 near Poorhouse Hill I saw a flock of five birds, two adults and three young. These, I think, must have been a family-group, and the probability is that they had nested somewhere in the immediate vicinity. All were surprisingly wary. On August 24 flocks of three and four birds were seen, either feeding along the ridges, or flying high overhead, calling in mellow whistles. I think, however, the birds were not yet migrating.

On August 26 a young bird in its first winter-plumage was seen near the Post feeding at one side of a flock of smaller shore-birds. On August 27 several were seen at Four Rivers, and one immature bird was collected along a mud-flat. No adults were seen.

At Hut Point on August 29 many young birds were seen along the outer beaches. None was noted on the inland tundra, and no adult was seen anywhere. The call-notes of the adults I wrote down as *wee-lee*, and *wee-li-er*. On August 31 I collected an adult male in much mottled plumage from a deep pile of sea-weed, where Ruddy Turnstones, Purple Sandpipers, and Sanderlings fed. The numerous young Golden Plovers were noticeably less suspicious than the adults. In all specimens secured thus far during the season the adults were much fatter than the young.

On September 2 and 3 many young birds were seen at Cape Low and at the mouth of the Ranger River. No adult Golden Plover was noted after September 1.

From September 4 to 8 young birds in their first winter-plumage were seen daily, usually in flocks of three or four, much as if family-groups were remaining together. On September 5 two females and on September 7 one male were collected. The Parasitic Jaegers, which abounded along the coast at this time, chased the shore-birds considerably; but I did not see them actually catch a Golden Plover, nor did I find remains of one in the stomach of a jaeger.

On September 12 I collected a young male and female (not fat) along a sandy beach west of Seal Point. On September 13 and 14 I noted several flocks of young birds on the high country back of the Post, where adults and young had been seen feeding together earlier in the season. A female shot on the 13th was exceedingly fat.

Young birds were noted on the following latest dates: three at the Post, flying in the distance on September 16; one at Lake Brook on September 19; two near the mouth of the Anderson River on September 20; and one at Seahorse Point on September 22.

The birds thus lingered rather late in the fall. We had considerable snow-fall on September 10 and the nights were very cold all through mid-September. Not once during the late summer or fall did I see a large migrant flock.

Spring Records: On June 6, 1930, Keetlapik saw many handsome Golden Plovers in full breeding-plumage near the mouth of the Koodloutok River. He shot three males and one female for me. All were fairly fat; their stomachs contained the remains of berries, which had evidently been found on the bare ridges, for there was much snow everywhere; the gonads of all were much enlarged.

On June 7 I saw two near the Post and collected a female in mottled plumage, which was, I think, a young bird, perhaps in its first breeding-dress. The specimen was fat and the ovaries were much enlarged.

On June 8 I noted one. The call-note I wrote down was a quickly repeated *whirl-ie*, *whirl-ie*.

On June 9 a flock of four and one solitary bird were seen at Prairie Point. The species was noted also on June 10, 11, and 12.

From June 12 to 25 I did not see a Golden Plover anywhere. I did not, therefore, observe any courtship antics, nor did I have occasion to hear much of the *too-di-lee, too-di-lee* cry which is responsible for the Eskimo name.

On June 25, however, quite to my surprise, I came upon a pair about seven miles north of the Post, and somewhat to the westward of Poorhouse Hill, which obviously were mated. Since I had seen so few of these beautiful birds and was so eager to collect more specimens, I shot the male before I realized they might have a nest. Just as I shot this bird, the female, as if wounded herself, fell to one side and began squealing and flopping about.

I withdrew to a distant pile of boulders and watched. The female called *pur-lee* or *cu-lee* again and again, as if waiting for an answer from her mate. Then she began moving toward me, stopping after each short, nimble run to call loudly and bob her body in characteristic plover fashion. Then she ran away from me, stopped, and came back. Finally, apparently distraught by the failure of her mate to return, she flew into the air and called loudly *wit, wit, wit, wit, too-di-lee, too-di-lee, too-di-lee*, as she swept up and down in graceful gyrations which were intensely interesting to watch. When she again alighted she ran briskly across the moss, stopped abruptly, jerked once or twice as she appeared to inspect something at her feet, and suddenly settled upon her eggs.

The nest was a neat, round depression in the moss, skillfully lined with bits of lichen, which evidently had been gathered with a good deal of care. It was placed on a plateau-like ridge of gravel a hundred yards from a small, upland marsh at one side of which a King Eider had her nest. No lake was nearby; and the shore of the Inlet was seven miles to the South. The female bird, which I collected also, was much duller in color than the male.

On July 3 a solitary, dull-colored adult, which I think was a female, was noted in the same region. I think this bird did not have a nest.

On July 7 I saw several mated pairs near the mouth of the Koodlootok River. Here, on the long, gradually sloping gravel-ridges, the plovers were really common, and their mellow cries sounded on every hand. On July 19, upon visiting this region again, I shot a male and heard the *too-di-lee* cries several times. The pairs were very faithful to each other, being seen together at all times. Young were probably abroad at this time, but I could not find any.

On July 22, 24, and 25, I noted mated pairs at Seal Point and in the high country back of the Post. I am sure these birds had young, for they indulged in various broken-wing demonstrations.

On July 28 I collected a well developed downy young bird, which must have been several days old, at the edge of a small lake about six miles inland. In the vicinity were three pairs of adult birds, all of which seemed to have young, for they flew about constantly, keeping up a continual outcry, dragging themselves about on the ground, trailing through the water, and lying on their sides as if mortally wounded. The cries of one bird were a combination of notes heard before: *too-di-lee, coo-lee, too-di-lee, coo-lee*, repeated rapidly. A low, grating *kek, kek, kek, kek*, was also heard. The parent birds stood very straight; they ran about in pairs, and sometimes came close to me.

The young bird, which ran slowly, and with great dignity, hardly moved its head, as it made its way through the grass over the gravel, and finally into the water, where it started to swim, then to my surprise, turned back. No other young was seen, though I searched the surrounding tundra with care.

On July 20 I saw a few adults at the head of Coral Inlet. The species was noted near the Post on August 1 and 4. On August 5 a flock of six birds flew over, high in the air. It is likely that these were a pair and their four fully fledged young.

Annual Routine: Golden Plovers, most of them in full breeding-plumage, arrive as soon as the tops of the gravel-ridges are free of snow. Many of these birds are probably mated by the time they arrive. Some birds which undertake nesting duties are in somewhat mottled plumage, which is probably that of the year-old, but sexually mature bird. As to courtship activities I can say nothing, since I did not witness any.

Nests are built not along the coast, nor among the coastal lakes, nor in the wide grassy prairies, but on the bald tops of the gravel-ridges, or in the plateau-like tundra of the interior. The only nest I saw was very neatly made.

The young stay with their parents until they are fairly well developed, even until they fly about with some assurance. The post-nuptial moult of the adults begins, however, shortly after the young have hatched, so that by the time the young are on the wing the parents are in a much mottled plumage. The adults leave two or more weeks in advance of the young. The young birds are thin at the time the adults leave them, but they become fat by the time they start southward. They do not gather in great premigratory flocks at any point on the Island, so far as I could learn. The post-nuptial moult of the adults does not involve the flight-feathers, at least while the birds are on Southampton Island.

The principal natural enemy of the Golden Plover during summer probably is the Arctic Fox, for the young are hatched inland from the usual hunting grounds of the jaegers, Duck Hawks, and Herring Gulls, and the wandering Arctic Fox and weasel are about the only predators which may disturb them. The Eskimos rarely kill birds as small as this for food, and the nests are built so far back from the encampments that the children do not stone the young, as they do those of the more confiding species.

Fleshy Parts: The eyes of this species, in both old and young, are always very dark brown. The eyelids are grayish. The bill and feet of adults are blackish; the feet of youngish birds, however, are rather brownish black. I did not see a newly hatched downy young.

Other Records: "*Charadrius pluralis*" is one of the species mentioned by Parry (1824, p. 41) as having been seen at Duke of York Bay. Lyon (1825, p. 47) mentions *Charadrius africanus*, evidently referring to this species. Rae evidently did not take a specimen at Repulse Bay, since no such specimen is mentioned in the Catalogue of Birds of the British Museum; but he mentions the species in his diary (1850, p. 71) on September 11, 1846, noting that the "Golden Plover and sandpipers [are] all gone [south]." Preble (1902, p. 101) says: "I found this species moving southward in small flocks at a point 50 miles south of Cape Eskimo August 4 to 8, and also, though in diminished numbers, 25 miles to the southward, August 10 to 13." Eifrig (1905, p. 239) says: "Not rare; some breed on Whale Point." Low (1906, p. 318) does not mention the species. Mathiassen did not record it in 1922. Soper (1928, p. 101) considers it "rare on Baffin Island." Mr. Swaffield secured a young bird at Mansel Island in the fall of 1929 (Sutton, 1932a, p. 42). We recorded it in the Chesterfield region in the fall of 1930 (Sutton, 1931c, p. 157).

Genus *SQUATAROLA* Cuvier.

23. *Squatarola squatarola* (Linnæus). BLACK-BELLIED PLOVER.

(Plate XVIII, fig. 4)

Eskimo Name: The Aivilikmiut called this bird the *Torgaiuk*, a clever imitation of one of the plaintive whistles, which is to be frequently heard in summer. Mr. Brandt tells me

that the Alaskan Eskimos call it *Too-lee-huk*. I did not learn the Okomiut name for the species.

Status: A widely distributed, but nowhere very common summer resident, not found on the grassy marshes between the coastal lakes, but on the dry gravelly ridge-crests, some distance back from salt-water. It does not range so extensively into the interior, as does the Golden Plover, but it is distinctly not a bird of the outer beaches from its time of arrival in spring until late in August. As a fall migrant, however, it occurs on the tidal flats, especially along the southern and western coasts. It seems to be much commoner in the fall than in the spring. This very likely is because of the abundance and tameness of the young birds, which after they have learned to fly make their way down to the coast. In the vicinity of the Post it was commonest at Prairie Point and near the Koodlootok River. As a migrant it was noted in the greatest abundance at Cape Low.

Fall Records: On August 25, 1929, we came upon two adults and two half-grown young along the margin of one of the large shallow lakes about four miles inland from Prairie Point. The adults, after being startled from their feeding grounds, circled about noiselessly twice, then made off. The young, which could not fly, were feeding among some floating vegetation at the edge of one of the pools. After a considerable chase I succeeded in capturing one of the lanky-legged creatures. The other, which appeared to be somewhat younger and smaller, ran into a clump of grass and disappeared. The old birds, which may or may not have been the parents, did not return while I remained in the vicinity. The half-grown specimen proved to be a female, quite fat. The stomach was well filled with the larvæ of aquatic insects, a few strands of mossy substance, and a good deal of sand. The plumage, particularly that of the head, back, and flanks, was tipped with a good deal of natal down, and the yellow marginal spotting was very bright, much brighter than in more fully developed individuals, and almost as bright as in the handsomely marked young Golden Plover. The young birds ran with long, graceful strides, which carried them at considerable speed. They did not bob their heads at all, though upon occasion they had to balance themselves by spreading or even "walking with" one of their flabby wings.

By August 27 all the young noted at Four Rivers appeared to be fully feathered. Adults too were seen in the region, but they paid no attention to the younger birds. On August 29 at Hut Point I noted several, all young birds, and collected a female from the mossy tundra about a mile inland. Adult males (very fat) in much mottled plumage were collected on August 30 and 31. The post-nuptial moult of the body-plumage was about half completed. On September 1 several were noted, including about twenty adults in the midst of the post-nuptial moult, and one young bird, the plumage of which still retained traces of the natal down.

The Black-bellied Plovers observed at Hut Point went about in loose companies, the adults (apart from the young) nearly always on the inland, mossy tundra, and the young on the gravel-beaches or stinking piles of seaweed. Both young and old were always dignified, even pensive in behavior, and the adults were usually wary. Their mellow, plaintive *too-ree* contrasted with the noisy, conversational chatter of the flocks of sandpipers, which swarmed along the shore. On September 2 I saw two Parasitic Jaegers chase down and kill a Black-bellied Plover, which was too young to fly well. By the time I ran up, the savage pirates had torn off and swallowed most of the warm breast of their victim.

On September 3 a young bird with much natal down in its plumage, and barely able to fly, was seen at the mouth of the Ranger River. On September 5 a flock of six adults in mottled plumage was seen at Four Rivers. After September 5 no adult birds were seen any-

where, though immature birds lingered until almost the end of the month. On the trip to Seahorse Point, a few young were noted almost daily. Near the mouth of the Anderson River three were seen on September 19 and several on the 20th. On the latter date a female, in full first winter-plumage, was collected. On September 21 eight were seen at Leyson Point and two immature males (not fat) were taken. All the birds seen ran about a little uncertainly, as if they were quite young. On September 23 three were seen at Seahorse Point. On September 25 three were observed near the mouth of the Anderson River, and two immature males (one a cripple) were collected. Both had been bathing in the salt-water. On September 26 Jack Ford saw a flock of about twenty-five young birds flying westward toward Native Point. I saw one at the mouth of the Anderson River during the evening of the same day. No Black-bellied Plovers were seen after September 26.

Spring Records: On June 9, 1930, one (sex uncertain) was seen at Prairie Point, running about on the snow. On June 10 three were seen.

On June 11 a male with unswollen gonads, and two dull-colored and considerably mottled females with much enlarged ovaries, were collected not far from the Post. None of these specimens was very fat.

On June 13, 16, and 17 pairs and single birds were noted, either near the Post, or at the head of Coral Inlet.

On June 19 a poorly feathered and rather mottled male was collected at Itiuchuk. There were bare patches among the belly plumage, as if this bird had been incubating. It was feeding deliberately along the edge of a gravel-lined lake. On the same date a mated pair were noted at Prairie Point.

On June 20 four pairs were observed in the region of Prairie Point. As we made camp along the outer beach, two birds flew over us. Later in the morning the liquid cries of mating birds drifted across the lakes from the gray plateau, which led up to Itiuchuk. All these birds were difficult to watch, save with the binocular. They ran along the very crests of the ridges like sentinels, never permitting close approach. I saw very little evidence of courtship, save occasional flights, which were accompanied by the usual call-notes, perhaps more rapidly given. Judging from the behavior of the birds I think they all had nests, and perhaps full sets of eggs on this date.

On June 22, as I made my way along the gravel-mounds just west of Itiuchuk, I suddenly spied a handsome Black-bellied Plover running along a ridge about five hundred yards away. I thought I caught just a suggestion of broken-wing antics, as the dignified creature ran along. I retired to a little gully and watched it closely. Within a few minutes it circled widely and then alighted much nearer to me. After a few short runs it settled on the eggs.

When I rose to come up to the nest, the bird left in a great hurry, and did not act at all as if injured. While I was photographing the eggs it, however, returned and wriggled about on the ground, giving hoarse cries, sometimes coming quite close. The incubating bird proved to be a male. The female was not even seen. The call-notes given were a plaintive *turah-ee* (a modification of the usual *too-ree*) and a low *quip*, which was given near the nest. The stomach was empty.

The nest was a shallow depression in the gravel, a short distance below the very crest of a gravel embankment between two upland lakes. The view from the nest was inspiring. Far to the eastward was the high headland at Itiuchuk and the East Bay country. All of the frozen expanse of Coral Inlet extended to the north. Even the purple cloudiness of Bear Island and Munnimunnek could be seen in the distance. Surely these birds had

selected a site, from which they could survey the surrounding terrain. The eggs were fresh.

When I showed these eggs to certain of the Eskimos, I was surprised to learn that even such good hunters as Amaulik Audlanat had never before seen them. He was amazed at their size, and could scarcely believe that they belonged to little *Torgaiuk*. The bird nests in such unfrequented places and is so rarely flushed directly from its eggs, that the natives do not often find a nest. When they noted that these eggs were fully as large as those of a tern, they said they would have to remember to look for them in the future.

On June 23 in somewhat lower country much nearer the Inlet, but on a similarly high ridge of gravel, I found another nest containing four fresh eggs. Here, too, the male was incubating. While I was at this nest, the female, also, came near, and there was considerable calling. The male gave a sibilant rolling cry before the whistled *too-ree*. Both birds were agitated, flew about me several times, trailed along the ground as if crippled, and flopped about squealing in a feeble voice; but all these demonstrations were decidedly dignified. I collected the male, which was in beautiful plumage. This nest was carefully lined with small pebbles, bits of lichen, and particles of moss.

On July 7 I observed two nesting pairs near the mouth of the Koodloutok River. The female of one of these pairs was much duller, and more mottled than the male. She may have been a year-old bird.

On July 17 a pair seen at Koodloutok River obviously had young birds, but I could not find any of them. On July 28 I saw one back of Poorhouse Hill, about eight miles inland from the Post, in a place where I had never before recorded the species.

Annual Routine: The Black-bellied Plover is probably mated by the time it reaches its nesting-grounds, though some courtship flights and demonstrations are performed as late as mid-June. Eggs are laid soon after the birds arrive, the nesting-site always being dry and rather high, since the birds apparently like to be able to survey the surrounding country as they incubate. Both sexes sit upon the eggs and care for the young.

Soon after hatching the young make their way down from the high country to the coastal lake belt and finally out to the beaches. They often leave their nesting-grounds while they are yet quite young, even unable to fly, so that by the time they reach the beaches they may not yet be free of natal down. Here, especially while they are in the awkward stage, they may be preyed upon considerably by the Parasitic Jaegers.

When the young leave the vicinity of the nest, the old birds apparently pay no more attention to them, and begin their post-nuptial moult, which first involves the plumage of the body. By the time they are ready to migrate they are much mottled in appearance. They do not moult the feathers of wings or tail before they leave Southampton. They move southward about three weeks before the young depart.

I have very few data, which throw light upon the route of the southern migration of this species. Judging from the behavior of a flock noted on September 26, some of the birds must fly down the west coast of Hudson Bay.

The natural enemies of the *Torgaiuk* are about the same as those of the other shore-birds. Nesting inland, as it does, it is not bothered much by the Eskimos. Parasitic Jaegers prey upon the young after they have moved down to the beaches.

Fleshy Parts: The eyes of both adult and young are very dark, the irides being a deep, rich brown. The bills and feet are blackish, somewhat duller and paler in young birds. The eyelids are dull greenish gray.

Other Records: Parry (1824, p. 41) includes "*tringa helvatica*" among the species noted in the region of Duke of York Bay. Richardson (1825, p. 352) says that it breeds in Melville

Peninsula to the north of Southampton. Rae apparently did not take a specimen at Repulse Bay, for none is accredited to him in the British Museum Catalogue of Birds. According to Eifrig (1905, p. 239) "a female was taken at Fullerton in June, 1904. They were not common." Low (1906, p. 318) says: "Found at Whale Point, Roe's Welcome, evidently breeding there." Mathiassen did not record it during 1922. Mr. Ford saw it repeatedly at Coats Island, both during summer and at times of migration, but he did not actually find a nest. Soper (1928, p. 101) gives us but two records from Baffin Island, where the species is evidently rare. Mr. Swaffield took an immature specimen during the fall of 1929, and an adult on May 19, 1930, at Mansel Island (Sutton, 1932a, p. 42). Bent (1929, p. 167) includes "Franklin (Fury Point and Melville Peninsula) [and] possibly Keewatin (Cape Fullerton)" in the breeding-range. We did not record it in the Chesterfield region during the fall of 1930 (Sutton, 1931c, p. 157).

SUBFAMILY ARENARIINÆ

Genus ARENARIA Brisson.

24. *Arenaria interpres morinella* (Linnæus). RUDDY TURNSTONE.

(Plate XIX, figs. 1, 2; Plate XXII, figs. 12, 15)

Eskimo Name: The only name I heard the Aivilikmiut use for this species was *Teliviatsuk* or *Teligiatsuk*, the first part of the word being an imitation of the battle-cry of the bird, a familiar sound all along the rough limestone beaches and low gravel-ridges of the southern coast. Soper (1928, p. 104) gives the name as pronounced in Baffin Island as *Tellevak*. According to Mr. Brandt, the Alaskan Eskimos call the bird the *Kye-uti-cat-tat-tah*, also, obviously, an onomatopoeic word.

Status: A widely distributed, usually common, and locally abundant summer resident along the southern coast; said by the Eskimos to be common along the west coast also, and at East Bay and Duke of York Bay. Along the rough shores of Fox Channel it is reputed to be less common. In the vicinity of the Post it was commonest at Seal Point at the mouth of the Koodlootok River and at Prairie Point. As a migrant, it sometimes appears in large flocks, at points where it is not seen in summer.

Fall Records: The Ruddy Turnstone was not often seen in the region of South Bay during the fall of 1929. On August 22 one in juvenal plumage was seen on the beach near the Post, feeding with some smaller shore-birds. On August 23 I collected a male and female from a flock of about forty adults in winter-plumage, which appeared to be migrating. When first noted, these birds were resting in a compact group on the top of a great boulder not far from the shore. On August 25 at Prairie Point several immature birds were noted along the limestone beaches. One of the call-notes commonly heard was a staccato *cut-i-cut-cut*.

A few birds, which appeared to be young, were seen at Four Rivers on August 27.

From August 29 to September 1 many were seen daily at Hut Point, where, owing to their striking coloration, their comparatively large size, and their harsh cries, they were decidedly the dominant bird of the tidal flats and the decaying heaps of seaweed, which they frequented. They were not as a rule very *ἄλπιε* standing about on their short, brightly colored feet, with heads drawn in and feathers puffed out. Upon being disturbed they pressed their plumage down, lifted their heads, and scolded, as they ran off. Their cries were varied: a harsh, rattling *tuk-i-tuk*; a monosyllabic *keu*; a rolling cackle, which sometimes ended in two sharp *tuk*-notes; and a low conversational *kuk*. They were not very wary. All appeared to be immature. While working through the sea-weed they did not often have occasion to use their bills in uncovering food; but among the gravel they ran about in a busi-

ness-like fashion, flicking the stones this way and that, and overturning flat pieces of limestone, which appeared to be a third as heavy as themselves.

At Cape Low on September 2 and 3 only a few were seen. At Four Rivers from September 4 to 7 small flocks, which may have been broods hatched in the vicinity, were observed with the White-rumped and Semipalmated Sandpipers. All were young.

One was seen near the Post on September 11, feeding along an outer beach in the middle of a wild flurry of snow.

I was told that the *Teligiatsuk* had not nested near the Post during the spring of 1929, so believed that the birds seen thereabouts during the fall had migrated southward, perhaps from the northern coast of the Island. I now think, however, that it had nested nearby and had simply not been noticed, for during the spring of 1930 we found it common at many places near the Post.

No turnstone was seen on our trip to Seahorse Point.

Adults noted in late August appeared to have completed their post-nuptial moult. All young birds appeared to be in full juvenal plumage, which was not being moulted.

Spring Records: The first Ruddy Turnstone, probably a male, appeared at the Post on June 7, 1930. A female (very fat) was collected in the vicinity on the following day; the ovaries were much enlarged.

On June 9 at Prairie Point about one hundred birds, most of them apparently mated, were observed, and two males and one female were collected. All these specimens were fat and the gonads much swollen.

On June 12 Keetlapik noted many at the mouth of the Koodloutok River and collected three males and two females for me. He said he thought the birds were all mated, but there was a good deal of chasing about due to the pugnacious instinct of the males, "who stirred up a fight whenever possible, for there was no other way to pass the time."

On June 17 at Seal Point and on the rocky islands nearby, which even on this late date were still surrounded with solid salt-water ice, I saw three pairs, and shot two males (not fat). On their bellies were bare incubation-patches, but I found no nests.

Male birds were in considerable evidence at this date. They stood on high rocks or on the crest of a ridge, watching their surroundings intently. As I drew near they called loudly in strident tones *ricky, ricky, teer, teer, tuck*, then flashed out to meet me, passing back and forth in front of me, perching on a stone to one side then flying to my other side, escorting me volubly wherever I went. When a Herring Gull came by, they dashed off in hot pursuit, cackling and rattling fiercely, and their 'bite' was quite the equal of their 'bark' for they plunged at the clumsy gull with real ferocity, pecking him hard *on the feet*¹⁹ until the big bird sometimes actually cried out.

On June 18 I noted about six pairs on the outer beach near Itiuachuk. On June 19, 20, and 21, at Itiuachuk and Prairie Point I spent hours searching along the gravel and broken limestone-ridges for a nest, but did not find one. The birds were everywhere in evidence, flying this way and that, uttering notes of anger and defiance, warning the countryside of my exact whereabouts, and giving chase to every gull, jaeger, or even tern, which went by. The crest of every ridge had its sentinel turnstone. I was accompanied by the birds constantly. Yet I could not see one going to its nest, nor did I succeed in flushing one from its eggs. I crept along the depressions between ridges then ran across the high places hoping to surprise a bird, but they always were too quick for me. Two pairs, at least, nested

¹⁹ This method of attack is decidedly interesting. Small birds, in driving off larger species, usually direct their attacks to the head, neck, or back.

very near my tent on the beach. I watched these birds through openings in the canvas but did not learn the whereabouts of the nest. About the time I felt one bird was at the point of returning to the eggs both would suddenly give a rattling cry and speed away out of sight. Yet whenever I went out, a turnstone always appeared from somewhere to give me a scolding.

On June 23 along the edge of the plateau east of Prairie Point, I solved the mystery. As I made my way along one of the gravel-ridges, perhaps half a mile inland from the Bay, I was suddenly greeted by a female Ruddy Turnstone, which came straight toward me, then passed to one side and glided in front of me with her boldly patterned back flashing handsomely. It occurred to me, quite overwhelmingly, that all this circling about me and the turning toward me of this gay back must be to some purpose. I sat down immediately. Suddenly a male appeared, and standing to one side, shook himself and began preening the plumage of his belly. The female kept up a ringing clatter, ran about and toward me, and occasionally flew about. The male, after about ten minutes' quiet rest, began running away. Finally he disappeared beyond the crest of a nearby ridge.

I waited a few seconds, then rose. Immediately the female came toward me as if bent upon attack and soared deliberately across in front of me, her back toward me. *I was tempted to watch her*; but I didn't. I kept my eyes on that part of the ridge, where I had last seen the male. And sure enough, before I had taken six steps, he appeared, flew straight toward me, and joined in the clamor. I ran to the spot whence he came and found, after a short search, the four handsome eggs.

Had the male in this case paid the usual prompt heed to the female's warning cry, he probably would have left his nest so soon that I could not have surmised its whereabouts; but he waited a trifle too long, and I saw him rise. Broken-wing antics were not employed to the slightest degree. The female definitely employed the bright pattern of her back to attract me; and, had I not been awake to the various probabilities in the case, I should have watched her so intently that I would never have seen the male. The coloration of the turnstone is, to some extent at least, divertingly protective. Since both sexes incubate, both sexes take occasion to make the most, upon occasion, of the striking color-pattern of their backs, to allure their enemies from their eggs.

The nest was a shallow depression in the gravel, lined with bits of pale green lichen, which evidently had been selected with some care. It was not sheltered in any way, though a small stone lay to one side, about two inches away. It was about three hundred yards from a small lake, probably half a mile from the frozen salt-water, and a few feet below the very crest of a smooth-topped ridge. The eggs had been incubated probably four or five days.

On the same date an Okomiut lad, Munnimee, found a fairly fresh set of three eggs on one of the rocky islets just off Seal Point. He brought these in for food, but I succeeded in getting them for specimens before they were broken.

From June 24 to 29, several pairs were watched daily at and near Seal Point. These birds without doubt had nests, but I did not spend much time with them. Call-notes which I jotted down were: *wicky, wicky, tuck-a-tuck*, and *kee-wick, kee-wick, kut-a-kut, kut*.

On July 6 I found a nest not far from Seal Point containing four eggs, which were at the point of hatching. This time the female was incubating. The male stood on watch on the stones or highest points on the nearby ridges, calling sharply. Before the female left the nest, he flew at me as if to strike me, but turned quickly to one side, passing along the ground so as to show off his bright back. When the female left the nest, she joined her mate, and both birds ran about nearby. The female was a little shy, and did not cry out much. Oc-

asionally she ran toward her mate and partly crouched near him. Finally she flew off to a nearby ridge, waited about ten minutes, then in three short flights and a quick run returned abruptly to her eggs.

This nest was neatly lined with a few tiny willow-twigs. It was placed in a depression between the spreading and more or less exposed roots of a willow-bush, which stood not far away. The eggs were much incubated; the young probably would have hatched within three days.

On July 7 I saw about ten pairs near the mouth of the Koodlootok River, but I did not have the time to look for a nest.

On July 9 at Seal Point I found another nest, containing four eggs. The male bird was incubating, when I first found the nest, but the female went to the eggs, as I watched. She approached first in a long, low flight, then, as she reached a point perhaps three feet from the ground, she fluttered down directly upon her nest. I saw the bird make this strange landing twice and thought it remarkable, if for no other reason, because it called attention so patently to the location of the eggs. This nest was situated at the crest of a rocky ridge, among open gravel between large flat stones. It was a mere depression scantily lined with bits of moss and lichens, about ten rods from the shore.

On July 12 I returned to this nest and found three young, and one egg still in the nest. The male bird was chiefly in evidence, and his clatter did not cease. He raced up to the lone egg, brooded it for an instant, rushed out to one young one to give it an encouraging peck, then half ran, half flew, to his other charges to make certain they were safe. His brooding-call was a low, but distinctly enunciated *chuck*. The young lay quite still. The female bird was not much in evidence. Another bird frequently came near to join in the outcry, but this was the male of a pair which nested nearby. I collected these three young, which obviously had just hatched. The egg proved to be infertile.

On July 16 I collected a young turnstone, which was somewhat larger and much stronger than those seen on July 12. It was difficult to capture, for it ran with great rapidity.

During latter July and early August the birds were exceedingly quiet. I did not collect any specimens, but noted that the adults were in the post-nuptial moult. Two were seen at Bear Island on August 4.

Annual Routine: If the spring is early, the Ruddy Turnstones may arrive before they have mated; when the season is late, however, as it was in 1930, they probably mate before reaching Southampton and set to work to lay their eggs almost at once. The nest is situated on a rocky or gravelly island not far from shore, or on a gravel- or limestone-ridge, not necessarily near a lake. Both sexes incubate. The young are hatched about July 15. They are cared for by their parents for a time, but run about by themselves from about the end of July onward. The adults at this time begin their post-nuptial moult, which is apparently completed before they migrate. The young postpone their migration some time after the adults have left.

The natural enemies of this species are about the same as of the other shore-birds. The turnstone does not suffer much, however, from the predatory birds, for it is so fierce in its attack that even the largest of them appear to be interested only in getting away as rapidly as possible. The eggs are occasionally eaten by the Eskimos; but they are too difficult to find to be gathered extensively.

Fleshy Parts: The feet and legs of adults, both male and female, are bright red-orange in the spring, becoming somewhat duller as the season advances, and considerably duller by the end of the summer. In both sexes the bill is blackish.

I made two field-sketches of downy young turnstones, one (July 12) of a bird just hatched, the other (July 16) of a bird several days old. In the younger bird the bill is *pale neutral gray*, save at the tip, which is black; and at the base of the lower mandible, which is slightly tinged with pale *capucine buff*. The legs and feet are almost *vinaceous fawn*, somewhat browner along the tops of the toes. In the older bird, the bill is no longer gray at all; the black tip extends backward, merging gradually into the dull *vinaceous fawn* of the base, there being a touch of reddish apparently inside the nostril. The feet are decidedly brighter, being *orange cinnamon* for the most part, with suggestions of purplish, pinkish, and dull yellow. In both specimens the eye is practically black, and the eyelids dull *neutral gray*.

As the bird grows older, the bill gradually becomes darker and the feet brighter, so that by the time the first winter plumage is complete, the legs and feet are quite orange and the bill rather blackish.

Other Records: Swainson and Richardson (1831, p. 371) say that this species breeds on Hudson Bay. According to the British Museum Catalogue of Birds, Rae collected a specimen at Repulse Bay. Rae makes at least one definite reference to the species in his diaries covering the Melville Peninsula subexpedition; under date of August 18, 1846 (1850, p. 185) he says: "numbers of Turnstone (*Tringa interpres*) were seen." Preble (1902, p. 102) observed "many small flocks about 25 miles south of Cape Eskimo." According to Eifrig (1905, p. 239) "two adults in fine plumage were taken in July, 1904, at Southampton." He characterized the species as "rather scarce." Low (1906, p. 318) says: "A few small flocks [were] seen about Fullerton." Mathiassen apparently did not encounter the species. Mr. Ford recorded it repeatedly at Southampton, and saw it also in summer on Coats Island. Soper (1928, p. 104) regards it as "probably extremely rare" on Baffin Island. Bent (1929, p. 294) includes "probably Melville Island" in the breeding range and states that Reinecke reports the eggs from "Hudson Bay." Mr. Swaffield took an immature bird in the fall of 1929, and an adult in mid-summer of 1930, on Mansel Island (Sutton, 1932a, p. 42). We saw numerous young birds in the Chesterfield region in the late summer of 1930 (Sutton, 1931c, p. 157), thus corroborating Bent's statement (*l.c.*, p. 290) that "there is a heavy migration down the west coast of Hudson Bay."

Family SCOLOPACIDÆ.

SUBFAMILY SCOLOPACINÆ

Genus CAPELLA Frenzel.

Capella delicata (Ord). WILSON'S SNIPLE.

A specimen listed in the British Museum Catalogue of Birds is said to have been taken by Rae at Repulse Bay. Since this species is known to range rather far north (see Bent, 1927, p. 94) there is nothing impossible about its having been taken there, though it seems probable to me that it was actually collected farther south.

I saw a single bird at Eskimo Point on August 31, 1930 (1931c, p. 157).

SUBFAMILY NUMENINÆ

Genus PHÆOPUS Cuvier.

25. *Phæopus hudsonicus* (Latham). HUDSONIAN CURLEW.

Eskimo Name: The Aivilikmiut called this curlew the *Shiootoouk*. This word does not, according to Amaulik Audlanat and others, refer to any special physical characteristic, such

as the strikingly long bill; and I think it is not onomatopoeitic. I did not learn the Okomiut word for the bird.

Status: An uncommon and exceedingly local summer resident and irregularly common migrant, which was noted chiefly along the southern coast, and which apparently is more abundant in the fall than in the spring. During my stay on the Island it was noted in mid-summer at only two places: to the eastward of Cape Low, at Hut Point, where it must have been nesting; and at Prairie Point, where a single bird was collected. I am of the opinion that, like the American Golden Plover, it may nest anywhere in the interior of the Island.

Fall Records: On August 20, 1929, in the high country about four miles inland from the Post, I saw a Hudsonian Curlew flying along the edge of a lake. It was very wary. It had been feeding with a scattered flock of Golden Plover.

On August 22 I secured not far from the Post a young male and female in handsome fresh winter-plumage. These birds were not wary. They were feeding among the large boulders along the shore, which had been exposed with the going out of the tide, and on the mossy tundra between the arms of the bay. Neither bird was very fat. When first startled into flight they gave several sharp, rapidly repeated *yips* which called to mind the whistle of a Greater Yellow-legs, *Totanus melanoleucus* (Gmelin). Their flight was deliberate and graceful, and they walked with great dignity. Their stomachs and crops were well filled with tiny snails, which they had been picking from the rocks and seaweed. When I showed these birds to the Eskimos, some said they had never seen such a creature, and Amaulik told me they were not common anywhere on the Island.

On August 24 I saw one erratically flying about high in air, as if uncertain as to where it should go. Finally it flew to the southward, across the Inlet, toward Prairie Point. Its cries might be written *cur-lee*. On August 25 one was noted at Prairie Point.

At Hut Point from August 29 to September 1 Hudsonian Curlews were seen daily, often in flocks of fifty or more. On August 29 I secured three, two males and a female, all of which seemed to be young. On the following day I collected three more. All these specimens were in good condition, but none was very fat. All had been feeding principally along the shore, but also to some extent, on the uplands. Their formation in flight was very interesting. Often they flew in long lines, more or less 'Indian-file.' At other times the flocks were wedge-shaped, or V-shaped. They flew with dignity, their bills pointed straight forward, their heads somewhat drawn in. Their call-notes had a startling quality, sometimes reminding me of the loud whistlings of a Greater Yellow-legs, sometimes of a sort of *quip-ip-ip* like that of an Upland Plover, *Bartramia longicauda* (Bechstein). I noted more than once, that when a jaeger came by, the curlews, after a loud warning, flew out and upward with all the other shore-birds, as if they too were afraid of these dark pirates of the shores. It was quite windy on August 30, and the curlews became exceedingly wild, feeding far out on the flats at the very edge of the water, and flying at the first alarm.

On September 1 several flocks of from twenty to fifty birds were seen flying southward out over Fisher Strait, bound apparently either for Coats Island, or for the west coast of Hudson Bay. They flew swiftly as soon as they had reached a considerable height, and disappeared rapidly.

On September 2 three were noted at Cape Low, flying *southeast*, high overhead.

On September 7 one was seen at Four Rivers, flying high toward the south over Fisher Strait and calling loudly.

When we returned to the Post from our trip to Cape Low, Jack Ford told me that during our absence on about the 31st of August, he had seen a large flock near Seal Point, one

of which he had shot. These birds upon leaving flew to the southward, toward Prairie Point.

We saw no Hudsonian Curlews on our trip to Seahorse Point.

From the rather meagre data at hand it appears that this curlew, like the Lesser Snow and Blue Geese, leaves the southern coast of Southampton during its fall migration not for the west coast of Hudson Bay, as might be expected, but for Coats Island to the southeastward. Even the birds noted on September 2 at Cape Low departed to the *southeast*, and not to the southwest; so that the birds, which cross Southampton, or which nest somewhere in the interior of the Island, probably move south along the east coast of Hudson Bay, or make their way across the height of land in Labrador for the north shore of the Gulf of St. Lawrence where they are known to congregate. No specimens taken in the fall appeared to be in any sort of moult.

Spring Records: On June 6, 1930, Jack Ford saw one near the Post with a flock of about twenty Red-backed Sandpipers. On June 11 I noted two birds flying northward over Seal Point, calling loudly. During mid-June, Tommy Bruce, who went to Cape Kendall for me, saw several mated pairs of curlews at Hut Point just inland from the point, at which we had seen so many birds during the preceding fall. He did not see the species elsewhere during his entire trip. He spent considerable time observing the birds, but did not find a nest. He told me he knew they were nesting there "from the way they acted."

On July 17 I collected an adult and apparently very old male at Prairie Point. Its plumage was much worn and faded; so much faded, in fact, as to be almost muddy in appearance, and its general condition was rather poor. The stomach contained some greenish vegetable matter and bits of gravel. I think it was unmated, for the gonads were very small.

Annual Routine: The Hudsonian Curlew arrives from the south in spring, as soon as the tundra is relatively free from snow. It is so rare in most parts of the Island that it is easy to believe that it makes its way straight to Hut Cove, the only nesting-grounds known at present. Since I have not seen the nest, eggs, nor downy young, I can offer no remarks concerning the mid-summer activities of the species. In fall the parents probably go south before the young; the young in their fresh juvenal plumage gather in flocks on the coast, then late in August or early in September, fly over to Coats Island, whence they continue their journey southward. They are not particularly fat at the time they leave.

Fleshy Parts: The legs and feet of all the young specimens taken during the fall of 1929 were dull bluish gray, with darker areas at the heel and on the under side of the toes. The bare lower mandible and a narrow area along the lower edge of the upper mandible were pale purplish flesh-color. The upper part of the upper mandible was dull gray-brown.

In a field-sketch of the adult specimen taken in mid-summer (July 17) at Prairie Point, the feet are not gray-blue at all, but a shade somewhat between *pea-green* and *vetiver green*.* The bill is dark throughout, the base being of a dull, purplish flesh-color. The eyes of all specimens were dark, the irides being deep rich brown. The eyelids were dull blackish gray.

Other Records: Rae apparently did not take this species at Repulse Bay, since no specimen is accredited to him in the British Museum Catalogue of Birds. Preble (1902, p. 100) saw "a few daily" on the Barren Grounds fifty miles south of Cape Eskimo. Eifrig (1905, p. 239) says: "Mr. Low says Curlew are not uncommon on Southampton and breed there. I suppose that would mean this species. None were taken." Curiously enough Low (1906, p. 317) does not even mention the species. Neither Captain Murray nor Mr. Ford en-

*Italicized words from Ridgway's *Color Nomenclature*.

countered it, according to their recollection, either on Southampton or Coats Islands. Soper (1928) does not mention it from Baffin Island. Mr. Swaffield took a specimen in fresh plumage in the fall of 1929 at Mansel Island (Sutton, 1932a, p. 42). We saw several at Chesterfield and at other points along the west coast of Hudson Bay during the late summer and fall of 1930 (Sutton, 1931c, p. 158).

Phaeopus borealis (Forster). ESKIMO CURLEW.

Kumlien (1879, p. 88) noted this species on Baffin Island in June, 1878, and collected one specimen. According to Bent (1929, p. 135) and the American Ornithologists' Union Committee (1931, p. 113), the breeding-range of the species is (or *was*) in the Barren Grounds of northwestern British America, in "northern Mackenzie, northwest perhaps to Norton Sound, Alaska."

Genus *TRINGA* Linnæus.

Tringa solitaria solitaria Wilson. EASTERN SOLITARY SANDPIPER.

A specimen, said to have been taken by Rae in 1846 at Repulse Bay, is recorded in the British Museum Catalogue of Birds. I am of the opinion that this bird was taken farther south, since there is no indication from the literature at hand that the species ranges thus far north. Preble (1902, p. 99) says: "The species probably occurs throughout the [Hudson Bay] region." My feeling, however, is that Preble, in making this statement does not mean to include the northern part of Hudson Bay. If Rae did indeed take a specimen at Repulse Bay, it may have been the Western Solitary Sandpiper, *Tringa solitaria cinnamomea* (Brewster), quite as readily as the present form.

Genus *TOTANUS* Bechstein.

Totanus melanoleucus (Gmelin). GREATER YELLOW-LEGS.

A specimen was taken by Kumlien (1879, p. 88) at Cumberland Sound, Baffin Island. Preble (1902, p. 98) found it "about 50 miles below Cape Eskimo, August 4 to 8."

Totanus flavipes (Gmelin). LESSER YELLOW-LEGS.

This species was not noted at Southampton, but a single individual was observed for some time at Chesterfield on August 19, 1930 (Sutton, 1931c, p. 158) where it was said to be common at times, especially during the fall migration. It is not included in Eifrig's (1905) nor Low's (1906) list. Preble (1902, p. 98) noted it as "abundant . . . 50 miles below Cape Eskimo, August 3 to 8."

SUBFAMILY CALIDRIDINÆ

Genus *CALIDRIS* Anonymous.

26. *Calidris canutus rufus* (Wilson). AMERICAN KNOT.

Eskimo Name: Hantzsch (1928, p. 222) gives the name, as heard in northeastern Labrador, as *Tullik* "perhaps from the voice." I heard no name for the species on Southampton.

Status: So far as I have been able to determine, the Knot has never actually been found nesting on Southampton. If it does not do so, it is one of the few species, perhaps the only one of regular occurrence, which passes through or over the Island *en route* to and from its nesting-grounds farther north. It is apparently much more common in the fall than in the spring, for we did not record it at all during the spring of 1930, whereas it was seen several times during the late summer and fall of 1929. Mr. Swaffield took a specimen in breeding plumage on Mansel Island, not far southeast of Southampton, on June 11, 1930. The points

nearest Southampton among the various places included by Bent (1927, p. 143) in the breeding-range, are Igloolik in Melville Peninsula to the north, and Winter Island to the northeast. I should not be surprised to learn that the Knot nests in the northern part of Southampton, probably along Duke of York Bay, or along the western coast, north of Cape Kendall.

Fall Records: Three were seen near the Post on August 22, 1929, a foggy day, feeding among the stones covered with seaweed and along clear pools at low tide, far out on a low rocky point. On the following day two were seen at the same place. On August 25 one was seen at Prairie Point, feeding at low tide at the water's edge on the outermost limestone bars.

On August 29 several small flocks were seen at Hut Point, and one immature male (not very fat) was secured. There were no traces of down anywhere in the plumage. These birds were very quiet and dignified in behavior, especially when compared with the turnstones which flashed and rattled along the beaches everywhere. As if annoyed by the small talk and noisiness of the other shore-birds, the Knots frequently went about by themselves, uttering their subdued, monosyllabic notes, or flying quietly from pool to pool. From their behavior I believe all the birds seen were family-groups of young, which were, perhaps, gathering into larger flocks, preparatory to further southward migration.

A few were noted at Hut Point on August 30 and 31; and on September 1, at least twice as many as had been seen on the preceding three days were observed, as if birds from farther north had just arrived, perhaps during the night. On this date I shot two females, in perfect first winter-plumage.

At Cape Low on September 2 and 3 many were seen, especially at low tide along the outermost pools.

On September 5 at Four Rivers many were seen and two immature males were secured. One of them had a peculiar growth on the neck, which had the appearance of a tumor of some sort. On September 6 a small flock was noted at Four Rivers. On September 7, the last date upon which this species was recorded, one was seen at Four Rivers at high tide.

Spring Records: This species was not recorded at Southampton in the spring. As heretofore noted, however, one was taken at Mansel Island, to the east, on June 11, 1930.

Annual Routine: I have so few data on this species that I can offer only one or two remarks on its annual routine on Southampton. I am of the opinion that the species may nest in the northern part of the Island, toward which it flies with a rush in the spring, not lingering at all in the vicinity of the Post on its way. During the fall the adults probably first leave for the south. The young birds, feeding together in family-groups, gradually work to the shores of Fisher Strait and thence southward in early September.

Other Records: Two specimens are recorded in the British Museum Catalogue of Birds from this general region: one labelled merely "Hudson Bay"; and one, collected by Rae, from Repulse Bay. Swainson and Richardson (1831, p. 387) describe a summer specimen from Melville Peninsula. Kumlien (1879, p. 87) records a small flock seen in November at Cumberland Sound, Baffin Island. Neither Eifrig (1905), nor Low (1906) even mentions the species. Mathiassen did not record it in the fall of 1922. Bent (1927, p. 143) includes "southern Franklin (Igloolik, Winter Island, and Cambridge Bay)" in the breeding-range. Mr. Ford did not remember having seen it either at Southampton or Coats Island. Soper (1928) does not give us any additional record from Baffin Island. Mr. Swaffield took an adult female in breeding-plumage on Mansel Island on June 11, 1930 (Sutton, 1932a, p. 42). We did not see it along the west coast of Hudson Bay during the fall of 1930 (Sutton, 1931c).

GENUS ARQUATELLA Baird.

27. *Arquatella maritima* (Brünnich). PURPLE SANDPIPER.

Eskimo Name: I once heard an Aivilik Eskimo refer to this species as *Owpalooktookomik*. Whether he was giving an actual name for the species, or not, I cannot say. The words translated are *red-boots*, and doubtless refer to the bright coloration of the legs and feet of the bird. The general term, *Shidgeriak*, was frequently applied, of course, as it was to all other shore-birds. According to Soper (1928, p. 97), the Baffin Islanders call it *Segalea*, or *Tudlik* (Hantzsch).

Status: Judging from the under-sized, obviously very young specimens, which were collected in the western part of the Island and which had traces of natal down clinging to the head; and from the reports of several Eskimos as to its mid-summer occurrence in the Cape Kendall and Duke of York Bay regions, I think this bird nests on Southampton, perhaps in some numbers. Personally I noted it only during the period of fall migration, in the Cape Low district, about South Bay, and at Seahorse Point. From what I have seen of the species elsewhere, I should say that it probably nests in considerable numbers at East Bay and Duke of York Bay, and along the inhospitable shores of Fox Channel.

Fall Records: On August 29, 1929, at Hut Point I saw two Purple Sandpipers: an adult with bright orange feet and legs, which stayed with a flock of turnstones on the outer beaches and along the piles of seaweed; and a juvenal male, very much under-sized, and with natal down all over the head and neck, some of which came off during the process of preparing the specimen. On August 30 I collected a juvenal male from a flock of White-rumped and Semipalmated Sandpipers. Traces of natal down were present on the chin and forehead of this specimen. The legs and feet, which were rather large and podgy, were dull orange in color. On August 31 two juvenal females were taken, both of which had remnants of the natal down clinging to the head. One was taken from a mixed flock of shore-birds; the other was seen feeding by itself at the edge of a large lake. I noted that it was easy to recognize these sandpipers while they were with other species of shore-birds, by their dark upper parts, which in flight showed especially from the rear; by their rather round appearance as they stood still or ran about; and by their tendency to fly behind or at the outer edge of a flock, as it circled about the beach.

At Cape Low it was evidently quite rare, since but one individual was noted on September 3, along the shore of a large lake not far inland.

On September 4 at Four Rivers I noted several birds, and secured an adult male, which had been probing so deeply for food among the decaying seaweed that the plumage of the head, neck, and breast was considerably soiled. In this region the Purple Sandpipers were not seen with other species of shore-birds; they remained altogether by themselves. On September 5 I saw five birds and shot three, two males and a female, all adults, one of which (a male) was in the height of the post-nuptial moult. I wrote down the call-note, which I heard these birds give, as *chew-ee*, "in a lower and rougher voice than that of the White-rumped Sandpiper." On September 6 two were seen along the outer beach among some large, half-buried boulders. Both these birds, which appeared to be adults, were in the moult, and the irregularly developed flight-feathers of the wings could easily be seen in the field. Young birds also seemed to be moulting at this time.

On September 11 I saw fair-sized flocks running along the outer beaches and on the slippery rocks at the water's edge near Seal Point, not far from the Post at Coral Inlet. One flock, which I watched for some time as they rested in a compact group on a wave-wet

boulder, numbered twenty-two individuals. In all I secured eight birds, three of which were males. All were in fair feather, though the moult had not yet been completed. None was especially fat. They had been feeding on small Crustacea which they found among the rocks. They associated a little with the White-rumped Sandpipers, but spent most of the time by themselves. I noted on this date that these birds, as they stood quietly among the boulders or dark-colored seaweed, were very difficult to see, even though when observed their bright orange feet and legs gleamed gaily. They were so tame that they would scarcely run out of my way, as I walked among them. All of these birds seemed to be adults in the last stages of the post-nuptial moult. On September 12 this same flock of birds were seen again at Seal Point, even though the weather was much colder. They walked unconcernedly about in the snow, their pretty feet seeming brighter than ever.

On September 16 two fair-sized flocks were seen at Seal Point on the outermost rocks. Here, hunched up and fluffed out with the cold, and heading into the fierce wind, they crept along the rows of heaped up seaweed, probing energetically for food. They looked like large gray mice. They were altogether silent. I collected four specimens, two males and two females, all of which were adults in almost complete winter-plumage. On September 17 a few were seen at Seal Point.

On September 18 a large flock were seen flying southward at sea not far from Bear Island; one bird flew about our boat several times and tried to alight.

In the Leyson Point region several were seen on September 19, 20, and 21. On September 22 at Seahorse Point, the remains of one were found in the stomach of a female Duck Hawk. On September 23 an individual in what appeared to be complete winter-plumage was observed for some time, as it fed at the edge of the stranded chunks of ice along the Fox Channel shore. Once or twice this bird, feeding among the piles of seaweed, found itself on floating masses of debris, which sunk with the added weight. At such times the bird *swam* without difficulty, making its way back to solid ground.

From September 24 to 26 several were seen at the mouth of the Anderson River, where they fed among the boulders, and not along the sandy beaches. On September 27 one tried to alight on our boat, as we made our way westward past Kikkuktowyak Island.

On October 9 Keetlapik saw three birds at Seal Point, running about in the snow. He shot an adult female (very fat) which he brought in to me. In this specimen the post-nuptial moult had not yet been completed. No more were seen after this date.

Annual Routine: I learned nothing as to the spring arrival, courtship, and nesting of this species.

In the fall, the young birds apparently stay together in family-groups; and, though they are not at this time exactly attended by their parents, the adults are, nevertheless, not far away. Both adults and young linger rather late in the fall before making their way south and both of them undergo a moult before they go. The adult post-nuptial moult is fairly well completed before the birds leave, the old primaries and secondaries being replaced by new ones, while the birds linger along the southern shores until the bays begin to freeze. The post-juvenile moult (only a partial moult, I think, not involving the flight-feathers) is undergone somewhat more deliberately, so that many of the young birds probably start south before this moult is complete.

During the fall migration the Purple Sandpiper frequents the outer beaches, where it hunts for food among the slippery boulders, or on the piles of rotting seaweed. It is not usually found with other sorts of shore-birds.

Its principal enemies are the same as those of other shore-birds, the Duck Hawk and the Parasitic Jaeger being the chief.

Fleshy Parts: The bill, feet, and eyelids of young birds were found to be duller than in the mature birds. Young birds taken at Four Rivers had orange or orange-yellow legs and feet; the bills were dull olive-brown, somewhat grayer toward the tip, and the eyelids were grayish. The eyes of both adults and young were dark gray-brown. The feet of the adults were sometimes quite bright, appearing especially so, when the birds had been feeding in the water or the damp seaweed. The bill of an adult male killed on September 4 was rather bright yellowish-brown at the base, darker at the tip and in the region of the nostrils.

Other Records: This species was taken in mid-summer on Winter Island, near Melville Peninsula, by Richardson (1825, p. 354). It was recorded by Ross (1826, p. 101) who says it arrived at Port Bowen, Prince Regent Inlet, early in June. There is recorded in the British Museum a specimen taken by Rae at Repulse Bay in 1846. Kumlien (1879, p. 87) says that hundreds bred at Cumberland Sound, Baffin Island, in 1878. Preble (1902) did not encounter it along the west coast of Hudson Bay. Neither Eifrig (1905) nor Low (1906) include it in their lists. Mathiassen did not see it at Duke of York Bay in 1922. Mr. Ford does not remember having seen it at Coats Island. Soper (1928, pp. 97 and 98) gives us several records from Baffin Island, where it is evidently the first of the waders to arrive in the spring. Mr. Swaffield took a male in breeding plumage at Mansel Island during the mid-summer season of 1930 (Sutton, 1932a, p. 42). We did not see it at Chesterfield during the late summer and fall of 1930.

Genus *PISOBIA* Billberg.

28. *Pisobia melanotos* (Vieillot). PECTORAL SANDPIPER.

Eskimo Name: Amaulik Audlanat and Santiana told me that the only name for this species among the Aivilikmiut was *Shushugheriak*. This word, or a word very much like it, is given also to other small sandpipers; Hantzsch (1928, p. 223) spells this word *Siksariarpák*, and tells us that it means "one who walks the beach."

Status: An uncommon and local summer resident, especially in the middle and western parts of the Island; not found in the rugged eastern portion. As a migrant it is commoner in the fall than in the spring. Probably all the birds which arrive at Southampton in spring remain to nest; whether the birds which frequent the beaches in the fall are all native to Southampton, or whether they have come from points to the northward or westward, I cannot say. The only nesting birds I located were at the head of South Bay and at Prairie Point.

Fall Records: On August 22, 1929, along a little muddy cove not far from the Post, I collected a juvenal male and a juvenal female specimen. One of these was with a small flock of Red-backed Sandpipers, and the other was alone. Both were in good plumage, and had traces of natal down in the region of the chin and forehead. Neither was fat. On August 23 and 24 I saw about three miles east of the Post a flock of four juvenal birds which were, I think, the young of one family.

On August 25 at Prairie Point among the grass-lined lakes quite a way inland from the salt-water I saw several groups of young birds, which were very tame. I looked at them with my glass and noted traces of natal down on the heads. I think all these had been hatched in the vicinity.

On August 27 a few were seen at Four Rivers. On August 29 several were observed at

Hut Point, where about half the birds seemed noticeably larger than the others. The species was recorded daily at Hut Point until September 1, on which date several small flocks were seen. At Cape Low small flocks were seen on September 2 and 3. I noted no tendencies toward premigratory flocking. The family-groups without their parents simply went about together.

At Four Rivers, from September 4 to 8, Pectoral Sandpipers were seen daily. They were nowhere common; but on September 7 I thought the small companies of three or four birds were congregating and condensing somewhat into larger flocks, perhaps for migration. They frequented the outer beaches and not the grassy meadows, where this species is customarily found. None was seen anywhere after September 8. I think I did not see a single *adult* individual anywhere during the fall of 1929. All the birds appeared to be juvenals, which had been reared nearby. I noted no indication of any post-juvinal moult.

Spring Records: I collected an adult male in perfect plumage and excellent condition on June 11, 1930. The bird was found in a little upland marsh, where it was feeding quietly at the edge of the water. The feet were very green or yellow-green as seen against the brown grass. The gonads were much enlarged, and the glands of the neck were so much swollen that they were difficult to remove from the skin. I noted no courtship antics of any sort, and saw no other individuals of the species on this date.

On June 13 Jack Ford saw many Pectoral Sandpipers at the head of South Bay and in the region just west of Itiujuaik. He heard them giving their queer, groaning and hooting noises, and collected one male (with much enlarged gonads) which he brought back to me in a sadly decomposed state. He told me there were probably fifty pairs courting in this region.

On June 20 I saw and heard one booming at Prairie Point. On June 22 at a lake nearby I saw two birds: one with neck and chest inflated and sagging; the other running about with plumage pressed down sleekly. I watched these birds for some time and feel sure they were nesting, but one bird seemed interested only in sunning itself and neither returned to a nest. The grassy meadow which these birds frequented appeared to me to be an ideal nesting-site.

On June 25 Jack Ford discovered a nest containing four eggs, which I think must have been of this species; but neither the eggs nor the parent birds were collected. Jack Ford was perfectly familiar with all the common shore-birds, and knew the Pectoral Sandpiper in particular, because he had always been interested in its hooting. He described the eggs as about the size of those of the Ruddy Turnstone. The nest was built in the grass, in a dry hummock in a damp spot between two large shallow lakes, and not on the open gravel, as almost invariably is the nest of a turnstone.

On July 16 I collected an adult male near Seal Point in a meadow, where I had never noted the species during the spring or summer. The gonads were not much enlarged. There were, however, bare patches in the belly-plumage, indicating that the bird had been sitting upon eggs. These patches, as well as the principal ventral apterium, were edged with new feathers, which represented, I think, the first stages of the post-nuptial moult.

Annual Routine: I have little to offer regarding the nesting of this species on Southampton. Evidently a certain amount of courtship activity takes place in the spring after the birds arrive. Judging from the condition of the male specimen taken on July 16, I should say that both sexes incubate. The post-nuptial moult is at least started before the adults leave for the south, but it probably is not actually completed on the nesting-grounds. The adults must migrate considerably earlier than the young, which linger about the beaches until at least the end of the first week in September. These family-groups, without the

parents, stay together separately, and not in large flocks, until the very eve of their departure, when they apparently congregate to some extent before moving south.

Fleshy Parts: The feet of all Pectoral Sandpipers I observed were distinctly green or yellowish green, those of the young birds somewhat paler and those of the spring male taken June 11 decidedly more yellowish. The base of the bill of a specimen sketched on July 16 was olive-green, brighter in a sort of spot on the lower mandible.

Other Records: A specimen collected by Rae at Repulse Bay is recorded in the British Museum Catalogue of Birds. Preble (1902, p. 96) found it "abundant on the Barren Grounds south of Cape Eskimo, August 3 to 13." Neither Eifrig (1905), Low (1906), nor Soper (1928) mention the species. Mr. Swaffield did not secure a specimen at Mansel Island. We did not see it along the west coast of Hudson Bay during the late summer and fall of 1930. Bent (1927, p. 178) says it breeds "mainly on the Arctic coasts of Alaska and Mackenzie."

29. *Pisobia fuscicollis* (Vieillot). WHITE-RUMPED SANDPIPER.

(Plate XVII, fig. 3; Plate XXII, fig. 3)

Eskimo Name: I never learned to pronounce the word the Aivilikmiut gave this bird. Once I wrote it down as *Shidjeriak*; again as *Shidgurghiak*; and yet again as *Shushugheriak* and *Shushugheriatsuk*. Hantzsch (1928, p. 223) gives the name as *Siksariak*, "the one who walks on the strand." According to Soper (1928, p. 98) the name in use on Baffin Island is *Levilivela*.

Though the Eskimos were fairly accurate in identifying the larger birds, they were not so discriminating with the smaller ones. Thus the word *Shidjeriak* occasionally was used to signify sandpipers or "beach-birds" in general, and, since the White-rump was one of the commonest of its family, the word came to be used principally with this species. No word for the bird called attention to its white rump, or to its striking courtship flight.

Status: The White-rumped Sandpiper is an abundant and widely distributed summer resident over most of Southampton; it is apparently less common in the eastern, more rocky part. It is found several miles inland during the summer, but is commonest among the lakes which lie not far back from the coast. In migration it is customarily seen along the muddy or gravelly beaches, or on the uplands between the lakes, but not along the lake-shores. During the summer of 1930 it was, with the exception of the all but ubiquitous Semipalmated Sandpiper, the commonest of the shore-birds, and according to my observations, was the third commonest of the birds of the Island, the Lapland Longspur being first, and the Semipalmated Sandpiper second. During the fall migration it bands together in tremendous flocks. These flocks may include individuals, which have summered in regions to the north of Southampton, for instance in Melville Peninsula.

Fall Records: Among the first birds seen at the Post on August 17, 1929, was a half-grown White-rumped Sandpiper, which spent most of its time in a damp depression, where refuse had been dumped near one of the little buildings. Since I had journeyed several hundred miles for the express purpose of studying the bird-life of Southampton in its own wilderness surroundings, I went to some pains to frighten this bird to a more pleasing setting. It annoyed me that any orthodox young Arctic shore-bird should show any predilection for tin cans and barrel-hoops.

Within a day or two I had seen many young White-rumps. Most of these were solitary. They ran about among the rocks, usually some distance back from the beach, and fed in

grassy places along the margins of shallow lakes, or in shadowy places between the boulders. They were quite reddish-brown on the back and the white rump-patch was in all cases plainly visible, though some of the birds could not yet fly at all well. On August 20 one of the Husky boys killed a juvenal male bird with a stone. Traces of the natal down were to be seen on the forehead, neck, and tibial region of this specimen.

I did not, during the late summer of 1929, note any *flocks* of this species, until August 22, and even at that date the under-developed young birds were still to be found by themselves, quietly running about the edges of the pools, while the flocks of well-feathered, and apparently full-grown birds frequented the beaches together with many Semipalmated and Red-backed Sandpipers. In view of my experiences with the migratory birds during the summer of 1929 I am inclined to think that my reason for not recording flocks of White-rumps before August 22, is simply that I did not happen to see them, for as a rule they are flocking or actually migrating considerably before that date.

Young birds, with traces of natal down, were seen daily at a distance, or examined closely, as late as August 30. Thereafter it was unusual to find a solitary, under-developed bird. Apparently the young, as soon as they became capable of keeping up with the flocks, wander down to the beaches and join the bands of full-feathered migrants.

The flocks of White-rumps were well worth watching. Most of their time they spent running along the beaches, probing nervously for food, stopping for an instant to preen their plumage, lifting a foot up behind a dropped wing to scratch an ear, then racing off anew to continue their feeding. They were noisy and excitable. Often they paused for a moment in their feeding; then, without any sort of warning, so far as I could see, suddenly leaped into the air to dash away at terrific speed, as if pursued by demons. These flocks milled about near me, turning now this way, now that, the gray of their backs melting into the monotone of mud and distant moss, the gleaming white of their breasts flashing as they twisted in their flight. They seemed to be curious, whirling near me again and again, and sometimes coming so close as to confuse me with the rush of their wings and the sharpness of their squeaking cries. Then, after gyrating ten or twelve times they decided to settle once more, and came to rest, with much fluttering and outcry, only a few yards away.

The tactics of the flock had, no doubt, to be mastered, for these little shore-birds were constantly pursued by Parasitic Jaegers, and irregularly by Duck Hawks. When a jaeger came by, the flocks rose as they did when I disturbed them; then, instead of racing away as rapidly as possible from their persecutor, they made straight for him in the most amazing way, whirled about him, mounting higher and higher, twisting, turning, flying at him, separating into two or three bands, then joining again. The little birds seemed to realize that, as long as they kept closely together, they were safe. It was the jaeger's problem to cut *one* bird off from the flock, for individual pursuit. So long as the flock kept the jaeger from deciding upon a victim, all were safe. The problem became more complex, of course, when two or three jaegers gave chase.

The Parasitic Jaeger was at Southampton the principal natural enemy of the White-rumped Sandpiper. During the summer the mated pairs nested in relative safety, for the jaegers seemed to prefer to hunt along the shore among the migrant or non-nesting birds. But in the fall, when the flocks of shore-birds had assembled, and when the young jaegers, too, were abroad and begging insistently for food, the destruction of White-rumps went on apace, and many were caught every day.

During August and September one of the commonest sights along all the southern coast of Southampton was the pursuit of flocks of shore-birds by jaegers. The dark hunters were in

evidence everywhere, coursing near the ground, gracefully moving along in small bands, seeking their prey. The shore-birds were ever on the alert for them. But there were always those individuals among the great flocks which were too slow; and these were cut off from the rest, chased down, and killed. When two or three jaegers succeeded in segregating a shore-bird, its fate was usually sealed. Turn as the little victim might, there was always a black monster to slash in upon it from one direction or another, and the stern game was soon over.

On September 5 at Four Rivers I watched a pair of Parasitic Jaegers chasing a White-rump for a long time. They flew far out to sea for a while, then returned, the sandpiper obviously at the point of exhaustion. All at once the little bird made straight for a pile of stones and, with a quick turn, disappeared. I could tell from the actions of the jaegers that the sandpiper was somewhere among the stones. I came up, turned over most of the cairn and finally found the sandpiper crouched in a lemming burrow, breathing hard. I lifted it out, let it rest a moment in my hand, then liberated it. It stood on my palm for just an instant, then blinked its eyes and dashed off merrily as if nothing in the world were amiss. For all I know, it actually had forgotten all about the jaegers in the excitement of the newer and more unusual adventure of being picked up in the hand of a man.

The jaegers showed a preference, of course, for the younger shore-birds at this time of the year, since these were easier to capture. Sandpiper remains taken from the stomachs of jaegers during late August and early September, very often included partly developed primary feathers.

Duck Hawks also preyed on the White-rumps; but the Duck Hawk was much rarer than the Parasitic Jaeger. The tactics of the shore-birds in evading these two species were, so far as I could see, precisely the same. Foxes and weasels doubtless catch both old and young, and foxes eat the eggs; but these mammals on the whole are not especially destructive to such a widely distributed species as this.

The large flocks of White-rumps seen along the coast in the region of Cape Low were nearly all in the juvenal plumage, in which a considerable amount of tawny color showed. A specimen shot on September 4 was in perfect plumage of this sort. Some birds seen on September 5, however, were quite gray. These were probably adults in the midst of their post-nuptial moult. An adult female, taken on September 16, and an adult male and two adult females taken on September 17, were in changing plumage, the clear gray of the winter-feathers showing in great contrast to the brown, worn, summer-plumage.

The largest flocks of White-rumps were seen on September 20 and 21 in the vicinity of Leyson Point. Here huge masses of the birds were congregated on the tidal flats, running about, through and between the shallow pools, by the tens of thousands. Among them were many Sanderlings and Semipalmated Sandpipers, a few Purple Sandpipers, and one or two Baird's Sandpipers. At Seahorse Point not nearly so many were seen, and the small flocks did not inhabit the rocky, ice-strewn beaches, but the damp places between the upper ridges and the margins of the small lakes. These birds were for the most part in mixed plumage. Most of them appeared to be young in the post-juvenal moult.

On September 25 and 26 large flocks were seen near the mouth of Anderson River. Twice, while returning to the boat late in the evening, I had occasion to tramp the beach for miles. In walking along I frightened from their roosting quarters flock after flock of drowsy White-rumps, which were clustered behind stones, along ridges of kelp and other seaweed, and in little depressions in the sand. They flew off with reluctance, sometimes lingering until I almost trampled over them.

By September 28 the harbor at the Post was beginning to freeze, and we had had several snowfalls; but the White-rumps continued to be common. On September 30 I saw large flocks at the head of Coral Inlet and smaller bands near the Post. A male and female (both young) secured on this date were exceedingly fat and the moult in the two specimens was in decidedly different stages. On October 1 several small flocks were seen, especially along the stream margins, where ice had not yet formed. During a savage storm on October 3 I saw several flocks flying about and feeding along the beach near the Post. On October 7 (Temperature 22° F. at noon) I saw one near the Post. The harbor was frozen shut by this time. On October 8 I saw three at Seal Point; on October 10 one was noted at Seal Point; and on October 12 I shot a badly crippled adult male at Seal Point, but it was in such poor condition that it could not be saved as a specimen. Its back had been gashed, perhaps by a jaeger, Duck Hawk, or White Gyrfalcon. The summer-feathers, which had not moulted, were matted together with blood and filth.

Thus it appears that the hardy little White-rump occasionally lingers even as far north as the Arctic Circle until winter has actually well begun. Whether these late birds perform their migrations successfully I cannot say; but when we know that individuals are found at Southampton as late as October 10, it is not surprising that there are occasional late autumnal records in the United States. The late birds frequent the streams and marshy spots inland, rather than the beaches; they run about through the snow with as much ease and self assurance as are exhibited by the Snow Buntings or Lapland Longspurs.

Spring Records: I did not obtain any definite data as to where White-rumped Sandpipers first appeared on Southampton in the spring of 1930, and therefore cannot venture a guess as to whether their principal migratory route is from the west and southwest along the west coast of Hudson Bay, or whether they come in from the south or southeast *via* Coats Island.

On June 3 one was seen at the Post flying feebly against the fierce, drifting wind. The snow was from two to ten feet deep nearly everywhere on this date. The unfortunate bird disappeared before we could capture it. On June 6 I saw a flock of four near Seal Point. On this date there were some bare patches, where various kinds of birds, principally Lapland Longspurs and Snow Buntings, were congregating. On June 8 much of the snow had disappeared on the broad ridges and I saw several small flocks of White-rumps. All these birds were surprisingly wary. They were feeding in open meadow country among the short, dead grass. I secured a male and female. Both were fat; their gonads were much enlarged; and their plumage was bright, the streaking on the breast being noticeable even in the field. By the next day courtship antics of one sort or another were in evidence everywhere. I shot a handsome male whose gonads were much enlarged, and whose lower neck and chest were swollen much as in the Pectoral Sandpiper.

By this time the White-rumps had returned to their nesting territories. They were to be seen everywhere in the wet, brown meadows, flying about in small flocks, or in pairs. Single birds frequently gave themselves over to peculiar exhibitions of one sort or another. Both sexes took part in various chasings, though the males appeared always to be the more demonstrative. The first pronounced courting activities were noted on June 11. On this date a male was watched for some time. He flew about near me, his wings quivering as he sped by, and his chest oddly inflated. He held his wings stiffly as he gave a peculiar buzzing note, which reminded me of the sound which accompanies the shifting of the carriage of a typewriter. On June 17 I watched another bird, as it hurried over a little marshy spot, giving a queer cry which reminded me of the nasal *peent* of a Woodcock, *Philohela minor* (Gme-

lin), several times repeated, followed by the low, mysterious, guttural rattle which had reminded me of a typewriter. I saw only one bird on this date and supposed the female must be on her nest. On June 23 at Prairie Point I watched performing birds for about half a day. I felt certain there must be eggs in the nests by this time, but I could not find any. I wandered back and forth across the upland meadows watching carefully for flushing birds, or for some sign of nest building. But I saw no sign. All at once a White-rump would mysteriously appear from behind me, flying rapidly by. Then another would give chase, following it all over the meadow, dashing here and there, setting its wings for short sails through the air, puffing out its chest, and finally, after forcing the other bird to the ground or chasing it away, mounting to a height of perhaps a hundred feet where it indulged in a long, hovering flight in which for sometimes *over twenty minutes*, it remained as if suspended by a string, hovering, hovering, its slender, graceful wings beating so rapidly and so incessantly that my eyes wearied in watching them. About every thirty seconds during these flights queer sounds were given as the chest was puffed out and the wing-beats somewhat slackened. The sounds included the prolonged rattling buzz before alluded to and a very peculiar disyllable which I wrote down at the time as "quo-ick" repeated from three to eight times. This whole performance was decidedly the most spectacular courtship display which I observed among the resident shore-birds, and the endurance the birds displayed in hovering for such a long time in one spot, facing always in the same direction was amazing and thrilling to me.

The fact that I could not find a nest puzzled and disturbed me not a little. Bearing in mind that the White-rump is known to undertake its autumnal migration very early at times, I began to fear that the young birds would be hatched before I had discovered any eggs.

On June 24 I learned why the nests are often so hard to discover. In crossing a little ridge and descending to a grassy swamp I noted a White-rump heading straight for me from the middle of the swamp. When it came near it turned to one side, and dashed off. Immediately another bird appeared from somewhere, and there was the customary chase. I kept my eyes, this time, on both birds. After the pursuing bird had circled about three or four times it mounted to the sky, gave a little of its courtship flight, and came toward me again. The other bird settled on the opposite side of the swamp. I retraced my steps to a sheltered place near a large boulder, where I could survey the little swale in front of me. Finding the bird at last with my glass, I watched it closely. It made its way rapidly through the grass, hesitating but little, straight to its nest. When I stood up it rose immediately, flew straight toward me, and the whole procedure was repeated. I watched the bird do this three times before I finally found the nest. In settling on the nest the bird did not hesitate at all, but crept in, puffed out the belly plumage, and squatted promptly.

The female bird was incubating on this nest. While I was examining, photographing, and collecting the eggs, the bird sneaked in slyly and began wriggling and squeaking only four or five feet away in the grass. She did not flutter off, as if injured, but puffed her feathers out, crouched, and crept along spreading her wings and tail. The male stood his ground afar off, while the female was demonstrating near me. Finally he rushed in, squeaked a good deal, then stood up and lifted one wing high in air in a peculiar and very characteristic manner. He dashed after other birds which flew by, and drove them off with gusto. His especial enemies appeared to be the two Semipalmated Sandpipers, which had a nest nearby.

Only the female of this pair was collected, so I am not certain whether the male had been also incubating. The nest was a mere depression in the wet moss, well lined with grass blades and crisp dead willow-leaves. It was somewhat sheltered by low willow-bushes,

and was not far from several tiny pools of water. Nearby were nests, with eggs, of a Semipalmated Sandpiper and a Lapland Longspur. The four eggs, which were nearly fresh, were exceedingly handsome, rather bright olive-green in color, marked chiefly about the larger end with bold spots of dark brown and gray.

A few hours later in a wide marsh, less than half a mile away, I found another nest. In entering this marsh I took pains to watch for a White-rump. When one appeared flying toward me, I simply stepped aside, crouched, and waited for the two birds to come to rest. Within five minutes I had located another nest with four eggs. The female in this case also was incubating, and the male did not pay much attention to me. The female in returning to her nest ran and walked fully three hundred yards from the edge of the marsh. She proceeded in a hesitant, nervous way, in short runs, ducking under and between the grass-blades and willow twigs. The eggs, while dominantly olive-green, were not so bright in hue as the first set. On leaving the nest this bird also rose abruptly and flew straight toward me. She did not trail off through the grass, as if wounded. The male birds of both these pairs did not spend much time in displays of any sort; but both of them, after alighting near the nest, lifted one wing in a comical manner, a custom which appears to be unique.

On the following day I found another nest at the grassy edge of a pool, not far from the base of a low ridge. I came upon this nest very abruptly and the bird flushed at my feet. It did not fly, but jumped off, ran a short distance, then crouched in the water, puffed out its feathers, and wallowed, squeaking loudly and excitedly. I do not know whether this was the male or the female, though its size seemed to be that of the female. The nest was beautifully built in an islet of green moss. It was only five inches above the level of the pool. The eggs were gray-green in ground-color.

At this season single birds were sometimes seen feeding in the short grass, or on the mud in the tidal flats. One such bird, collected on June 29, proved to be a male. The gonads were much enlarged, so I think it must have been a mated bird; but there were no bare spaces on the sides of the belly, and I am inclined to think that only the female of this species incubates.

During early July, before the young had hatched, migratory tendencies were in evidence. On July 7 I saw a loose flock of six birds flying about the Post. At the same time I noted several pairs nearby, and heard a little courtship squeaking. On July 9 I saw several little bands, which seemed to be composed chiefly, if not altogether, of male birds which were moulting. On this date I shot three specimens: a male from a flock very much in the moult, and with no evidence of bare patches on the belly; and two females, not from flocks, both of which had been incubating and both in firm, full plumage. On July 10 flocks of from three to ten birds, all apparently males, were noted along the salt-water flats. Inland only single birds, most of them females, were in evidence. On July 11 and 12 small flocks of males were seen constantly.

The collection of an albinotic male on July 12 is of special interest, not alone because of the unusual coloration of the plumage, but because it was evidence to me that a definite migration was under way. I had covered the ground about the Post so thoroughly that I had seen practically every nesting pair of birds within a radius of about four miles. I had located and become fairly well acquainted with the territories of perhaps sixty pairs of White-rumps; but at no time had I seen any white bird of this sort during the entire season. I am reasonably certain it had come in from other parts, with a small band of migrants, all five of which were spending a little time near the Post. I watched these birds carefully, and, while I did not collect any others, I feel sure they were all males. I do not know whether

the albinotic specimen had bred. The gonads were not enlarged. Perhaps it was a year-old individual, not sexually mature.

On this same date, about three miles inland, I found the first downy young. Here, in a little meadow, a female by herself, *with no male anywhere about*, was found brooding her recently hatched offspring. I watched this bird for an hour at least before I succeeded in capturing the entire brood, and I never saw her mate. The young birds were at first exceedingly difficult to locate. In the brood were two males and two females. On the same date another lone female with four young was encountered. Both mother birds were much agitated at my presence and threw themselves at my very feet, running about anxiously, squealing loudly, and wallowing on the ground. I almost caught one with the butterfly net. The brooding call, to which the young birds responded immediately, was a sharp "*chit-chit*," a cry very similar to the usual call-note, but sharpened somewhat. The young ran with amazing rapidity, but chilled quickly.

By mid-July the males appeared to be by themselves in flocks near the coast, though not, as a rule, on the beaches; the females, with their young, were in the inland meadows; no courtship cries of any sort were to be heard any more, and all adult birds were in the moult. On July 15 a flock of about twenty males were observed again near the Post. This flock increased in size from day to day. In it were a few larger birds, which may have been non-breeding females, females whose eggs or young had been destroyed, or females whose young had by that time become well developed.

On July 19 I caught two well developed downy young and spent some time photographing them and their much agitated mother. The various ruses employed by this bird were most interesting. She squealed and circled, wallowed on the ground, went through some broken-wing antics, which reminded me of those of a Killdeer, *Oxyechus v. vociferus* (Linnaeus), and then, after almost running between my feet, in a desperate attempt to lead me off, finally adopted an entirely new method of attracting my attention, and stood nearby on one foot, fluffed up her feathers, tucked her bill under her scapulars, and proceeded to go to sleep. The only flaw in this otherwise perfect and most comical ruse, was that she did not quite close her eyes. She stood there with the sleepest expression on her face, but her gaze never left me for an instant. I noted in this female bird, and in others also, that the tips of the folded wings extended well beyond the tip of the tail, when the bird was at rest.

On July 24 and 25 I observed fair-sized and large flocks swing down from the upper air. These, I believe, were migrants from farther north. The flocks were composed of both sexes. On July 31 the flocks of adult birds, which frequented the coastal tundra and the beaches, were very large.

Inland the small flocks and family-groups of partly developed young frequented the meadow-lands; but by this time no adult females were to be seen with them. Even as late as August 5 I saw partly developed young in the inland marshes, running about by themselves without any guardian.

Annual Routine: Males and females arrive at about the same time from the South, as soon as the snow is melted sufficiently to permit them to find some food on the gravel ridges. Many of these birds are mated, when they arrive. Others mate after they reach their nesting-grounds. Nest-building and egg-laying proceeds almost immediately, only the female incubating. The eggs almost invariably number four. The nests are usually placed on dry spots in the marshy swales.

By the time the eggs are all laid the males leave the females, go to the outer beaches, and finally flock together in small bands. The females care for the young by themselves,

staying with them until they are fairly well developed. Then the females come to the outer beaches, mingle with the males once more, or indeed keep in separate flocks for all I at present know, and let the young birds form their migratory bands as well as they can after they have developed. Whether the adults and young ever actually associate in large bands before they leave the Island I cannot say. The problem of determining the age and sex of the various flocks seen about the Post was too involved for me to solve in the time at my command.

The usual call-note of the White-rump is a mouse-like "*chit, chit*" or a sucking, in-drawn "*tsch, tsch,*" not very loud, and nearly always given, as here indicated, as disyllables. This same cry is used in somewhat modified form by brooding mother-birds, or by females just flushed from the nests. The courtship cries of the males are decidedly different. These notes are not loud, unless heard very close at hand, and they have a ventriloquial quality, which makes it exceedingly difficult to tell where they are coming from. So striking and so utterly unlike any other bird-cry I ever heard are some of these buzzing notes that more than once I found myself instinctively pausing, as if a rattlesnake or some other reptile had given warning nearby.

The precise function of the swollen glands of the neck of the male I have not as yet determined. That they have some connection with the sounds of the courtship period, or with the amazing display flight, is very likely. These glands adhere to the skin when the specimen is being prepared, and they must be carefully scraped off from between the rows of quills if they are to be removed without damaging the skin. The glands appear to be about a quarter of an inch thick in most specimens, and they are well furnished with blood-vessels. I did not see male birds sparring with each other in any way, nor did I see them puffing their chests out as they ran along the ground, as one might expect birds equipped with such neck-glands to do.

Since it so happened that I prepared specimens of both the Pectoral and White-rumped Sandpipers at the same time I had opportunity to compare the glands of the neck directly, and can affirm that in structure they are similar.

The adult birds migrate southward in the fall much in advance of the young. The young birds linger very late at times, sometimes until there is considerable snow on the ground, and they undergo part of the post-juvenal moult before they depart, so that late birds are usually quite gray in appearance. In this respect this species is, in a sense, unique. In most of the shore-birds found on Southampton, the young migrate without entering upon any post-juvenal moult. In two species which are known not to go very far south in winter, the Red-back and the Purple, such post-juvenal moults of the body plumage are begun and sometimes almost completed before the birds migrate. But in the White-rump, we have a bird which moves to far southern climes in the winter and yet takes on much of its first winter-plumage before it leaves its summer-home.

The natural enemies of the White-rump are the same as those of the other small shore-birds. The Parasitic Jaeger is by far the worst. The Eskimos pay no attention to it as a game-bird.

Fleshy Parts: The newly hatched young is a beautifully spotted creature which is very difficult to see, as it crouches on the moss. The eyes are almost black. The bill is dull brown, paler or brighter, *hazel-brown*²⁰ in fact, at the base of the lower mandible. The legs and feet are almost *Rood's brown*, brightest between the joints of the toes and at the heel,

²⁰All italicized words in this paper descriptive of colors are from Ridgway's Color Standards and Nomenclature.

somewhat pinkish at the heel and yellowish on the sole. These colors all merge, darken, and become less pronounced as the bird develops.

In breeding adults the base of the lower mandible is strikingly different from that of the young bird in first winter-plumage. This region is a warm, yellow-brown, sometimes quite bright, and distinct enough to be evident even in the series of dried skins at hand. The feet of breeding adults are dull, dark olive-brown, but they can hardly be called greenish, as some descriptions and illustrations would lead us to believe.

Other Records: Rae apparently did not take a specimen of this species in the region of Repulse Bay, since none is accredited to him in the British Museum Catalogue of Birds. Preble (1902, p. 96) says: "A number were noted on the Barren Grounds below Cape Eskimo August 3 to 8." Eifrig (1905, p. 238) says: "Three adults of this species were taken at Cape Fullerton May 22 and June 16, 1904. Not very common." Low (1906, p. 317) says: "Breeds in the swampy ground about Fullerton. Skins and eggs." Mathiassen did not record it in the region of Duke of York Bay in 1922. Mr. Ford recalled that he had seen it on Coats Island throughout the summer. Soper (1928, pp. 98-100) gives us a most interesting account of it on Baffin Island, where it is common during summer. Mr. Swaffield collected a specimen at Mansel Island during the summer of 1930 (Sutton, 1932a, p. 42). We noted it commonly about Chesterfield during the fall of 1930 (Sutton, 1931c, p. 158). This is rather surprising in view of the fact that Low found it so uncommon at Fullerton during 1904.

30. *Pisobia bairdi* (Coues). BAIRD'S SANDPIPER.

Eskimo Name: Soper (1928, p. 100) gives us the name *Tweetwee* as that in use on Baffin Island. I heard no name for the species on Southampton, aside from the usual *Shidgeriak*, which is applied to small shore-birds.

Status: I did not see this species during mid-summer, nor did I hear from the Eskimos any reports of the nesting of an unfamiliar shore-bird, which I felt must be this bird, but I think it must nest, perhaps only rarely, in the region of Duke of York Bay and elsewhere on the Island. As a migrant, it was noted among the first of the shore-birds in the spring at the head of South Bay, and it was recorded rather late in the fall. On the autumn trip to Cape Low in 1929 it was not noted at all, though it was seen several times in the vicinity of Leyson Point to the eastward. In the spring it was seen about South Bay, where it was not noted in the fall.

Fall Records: On September 20, 1929, while walking across the rocky tidal flats in a little cove not far from Leyson Point, I noted in front of me a solitary shore-bird which kept apart from the flocks of White-rumped Sandpipers, Purple Sandpipers, and Sanderlings, and which seemed to have a rather brownish appearance. When it flew off I noted its dark rump and its somewhat clayey color-tones, but was especially aware of a difference in its voice, or call-note, from those of the other shore-birds which were abundant all about me. This cry was mellow and rolling, to an extent suggestive of the flight-note of the Red-backed Sandpiper, but more musical. When the bird finally alighted far out on the flats, it chose an isolated feeding-ground. Finally I shot it, and recognized it at once by the scaled appearance of the back. It was a male, not fat.

On the following day another was seen in almost the same place. This bird also stayed by itself, not even flying with the other waders, when I frightened them. I was especially surprised at the antipathy the species seemed to show toward the White-rumped Sandpiper, for the two species were much alike in general bearing and behavior.

On September 25 a male (not fat) was collected along one of the high, neat beaches not far from the mouth of the Anderson River. This bird was rather secretive. It ran along ahead of me, skulking behind stones and seeming to be averse to flying. It paid little attention to the excited twitterings of the White-rumps, which flew up, as I walked along the beach.

On the following day two more were seen, as they flew up not far ahead of me, made their way along the beach, then darted out across the salt-water, as if headed for distant regions. I did not see the species again during the fall.

Spring Records: On June 5, 1930, I made a long trip afoot to the mouth of the Koodlootok River, with the express purpose of learning whether any birds were inhabiting the places in the tundra where the snow had melted. In this seven-hour trip, I saw very few birds, and by noon had noted so little of interest that I feared I should return without recording a single new arrival. As I made my way across a rolling gravel-mound, however, I suddenly sank into a little muddy bog, and noted about me traces of greenness in the moss. In an instant I knew this was a promising spot. Following up the damp places I finally came to a pretty upland prairie, perhaps an acre in extent, where, among the short brown grass, were six wary, drab-colored shore-birds of some sort, hunched up miserably in the shelter of a low bank. I shot one of two birds which seemed to be paired, and found it to be a Baird's Sandpiper. The plumage did not seem to be fresh, as if the pre-nuptial moult were still in progress. The specimen was very fat, and the ovaries were much enlarged. On the following day a solitary bird was seen near Seal Point, feeding on the uplands at the edge of the snow with a flock of Lapland Longspurs and Snow Buntings. Its call-notes were distinctive.

On June 8 two were seen at close range and observed for some time, as they fed in the damp grass in one of the sheltered valleys along a ridge about five miles northwest of the Post. At this season few shore-birds of any kind were to be seen anywhere in the region.

On the following day one was seen at Prairie Point. None was seen anywhere during the late spring and summer of 1930, but many were observed in the Chesterfield region in late August.

Annual Routine: Baird's Sandpiper arrives early in the spring, many of the birds being mated by the time they reach this latitude. In the fall it moves south principally across the eastern side of the Island, it appears; though it is not common at this season. Since we found the species so common at Chesterfield during the late summer of 1930, I cannot account for its apparent absence at Cape Low during the preceding fall. No obviously young birds were seen or taken at Southampton.

Fleshy Parts: The eyes of all individuals taken were very dark, almost black. The eyelids, bill and feet were dusky, almost blackish, with only a suggestion of brownness.

Other Records: This species has only infrequently been collected or recorded in this region. Preble (1902, p. 96) says: "The species probably occurs regularly in western Keewatin." Neither Eifrig (1905), Low (1906), nor Mathiassen (1931) mentions the species. Bent (1927, p. 200) includes "southern Baffin Island" in the breeding-range. Soper (1928, p. 100) says it "is much rarer on Baffin Island than the White-rumped Sandpiper, with which it is associated about Nettiiling lake."

Mr. Ford, to the best of his knowledge, never saw the bird on Coats Island, and Mr. Swaffield did not take a specimen at Mansel Island. We, however, saw it several times at Chesterfield in the late summer of 1930 (Sutton, 1931c, p. 158).

Pisobia minutilla (Vieillot). LEAST SANDPIPER.

This species was not seen during the year at Southampton, nor in the Chesterfield region during the late summer of 1930 (Sutton, 1931c). I kept a constant lookout for it among the flocks of "peeps," and collected every individual which I suspected might prove to be of this form. Rae apparently did not take a specimen at Repulse Bay in 1846. Preble (1902, p. 96) says that "immense flocks were seen on the Barren Grounds south of Cape Eskimo August 3 to 13, though at the latter date their numbers had greatly diminished." Eifrig (1905, p. 238) says: "This and the Semipalmated were the most common sandpipers in the region. A set of eggs was taken July 4 at Fullerton. The four eggs are, like all these sandpiper eggs, pyriform; the ground color of two is whitish, of the other two pale brown, with many dark brown, umber, black, and pale lilac markings." Low (1906, p. 317) says: "Found breeding about Fullerton. Skins and eggs."

It is indeed surprising that among the thousands of "peeps" seen in the Chesterfield region during the fall of 1930 there were no Least Sandpipers. Mr. Taverner, like myself, is inclined to look with suspicion upon all far northern records of this form, since according to the definite data at hand, the Semipalmated, and not the Least Sandpiper is the bird of the Arctic Archipelago and adjoining regions. In *Birds of Western Canada*, Taverner (1926, p. 139) says: "[The Least Sandpiper] breeds across the continent south of the Barren Grounds."²¹ Bent (1927, p. 209), probably basing his statement upon that of Eifrig and Low (*l. cc.*) says that the breeding range extends northward to "Keewatin (Cape Fullerton)."

Kumlien (1879, p. 86) noted what he considered this species at Niantlic, Baffin Island, in September, 1877; neither Hantzsch nor Soper (1928, p. 100) recorded it on Baffin Island, however.

Genus PELIDNA Cuvier.

31. *Pelidna alpina sakhalina* (Vieillot). RED-BACKED SANDPIPER.

(Plate XVII, fig. 4; Plate XXII, fig. 6)

Eskimo Name: The Aivilikmiut called this strikingly colored bird the *Aiviukak* or *Aiviukan*. This word is not an imitation of any of the creature's cries, but calls attention in some way to its long, slightly decurved bill, which resembles in the Eskimo's way of thinking the curved tusk of the *Aiviuk* or Walrus. According to Mr. Brandt, the Alaskan Eskimos call the bird the *Charomeruk*.

Status: The Red-backed Sandpiper is a common summer resident throughout most of the coastal region of Southampton, especially in the flat portions from South Bay westward, at Prairie Point, Native Point, and East Bay. It is one of the earliest shore-birds to arrive in the spring, and lingers rather late in the fall. It penetrates farther back from the coast during the nesting-season than either the White-rumped or Semipalmated Sandpiper, or the Ruddy Turnstone, being found in wet, marshy places, between the dry uplands which the Golden and Black-bellied Plovers frequent.

Fall Records: Red-backed Sandpipers were seen during the fall of 1929 almost whenever and wherever shore-birds of any sort were noted. During the late summer and at the height of the autumnal migration of shore-birds they were not, however, as common as the Semipalmated or White-rumped Sandpipers.

On August 22 near the Post I noted four and shot two; a male and female in almost perfect and very handsome juvenal plumage. Traces of natal down clung to the feathers of the chin, forehead, and crown. I think the four birds noted belonged to the same brood; but their parents were not with them.

²¹ Italics here are my own. G. M. S.

On August 23 about twenty young birds were seen, and a male in full juvenal plumage was taken. These were closely associated with the smaller shore-birds. They were unsuspicious, and permitted close approach, but they had a fashion of dashing off at any moment, as if pursued by a hawk or jaeger, without any apparent warning or reason. They probed in the mud and water ceaselessly, often keeping their bills down for some time, rapidly pumping their heads as they sought food with the tips of their mandibles.

On August 25 at Prairie Point two types of individuals were noted among the hundreds of Red-backs which frequented the limestone beaches: young birds in full juvenal plumage; and separate flocks of adults in noticeably *grayish* plumage. Many of these adults had black patches on their bellies and their coloration was somewhat blotched. The wings and tail, however, appeared to be fully feathered.

At Four Rivers on August 27, and at Hut Point from August 29 to September 1, most of the birds seen were adults in the latter stages of the post-nuptial moult. Some young birds also were seen; these were in the post-juvenal moult, spotted in appearance below, and rather blotched above.

At Cape Low on September 2 and 3 they were not very common. On September 5 many adults and young, usually in separate flocks, were seen at Four Rivers, and a poorly plumaged juvenal male (not saved) was found dead. On September 7 an adult male, two adult females, and an immature female were collected from the flocks of hundreds which trooped along the shore. A considerable difference in size, especially in the length of the bill of specimens taken, and of many individuals seen, puzzled me considerably. Probably younger birds had shorter bills.

On September 11 at the Post many were seen feeding along the tidal flats during a snow-storm, and I shot an adult male and female at Seal Point. These specimens were not fat; they were in the midst of the moult, the color of their upper parts being prevailingly gray. On September 12 a few small flocks were noted and two females (not fat) were collected.

During mid-September a few were seen nearly every day among the flocks of White-rumped Sandpipers, which swarmed along the southern coast. The species was last noted near the mouth of the Anderson River on September 21, when two birds, both solid gray above, but with traces of black on the belly, were noted on the tidal flats. No birds in *complete winter plumage* were seen during the entire fall.

The call-notes of this sandpiper were distinctive, and I learned to recognize them with-out difficulty; but they were not easy to syllabize. As a rule no note was uttered, while the flocks were feeding; but the minute they sprang into the air, distinct cries, which resembled the syllable *pler* or *cher*, were given as the birds circled about to a new feeding-place.

Spring Records: On June 6, 1930, I saw two flocks of Red-backed Sandpipers, one composed of twelve individuals, the other of six. These birds were feeding on patches of bare ground on the uplands north of Seal Point. Here at the very edge of the sinking snow-drifts they ran about busily, keeping in a closely-knit group, probing with their long bills, then standing quietly, in a hunched-up attitude, on their short legs, watching me as I drew nearer. A male and female were collected. Both had much enlarged gonads and both were fat. The stomachs contained remains of spiders, mixed with considerable sand. I observed no courtship activities on this date.

On June 8 as I hunted about the Post, several small flocks dashed by, flying about five or six feet from the ground. I shot a female (ovaries much enlarged) from one of these flocks.

On June 9 at Prairie Point I noted many birds, which seemed to be in pairs, and collected a male with greatly swollen gonads.

On June 10th the first courtship antics were noted, and a male in handsome plumage was collected. From June 11 to June 20 pairs and single birds were noted every day at the Post, Ford's Brooks, Itiuchuk, and Prairie Point. During mid-June Keetlapik saw many of them at the mouth of the Koodlootok River. During this period courtship activity was virtually continuous.

On June 13 a pair was observed for some time at the head of South Bay. The male had but one leg, this being in perfect condition, the other cut off close to the body. The bird, however, seemed to be in perfect health and spirits. How he managed to hobble about all day is beyond me; but he "ran" about friskily, preened himself proudly, and performed his dainty flights before his mate with as much enthusiasm as any Red-back I ever saw. At first meeting, I pitied the creature; but I left him with a feeling of warm admiration.

The courtship flight of this species is most interesting. The male usually performs by himself, but the female sometimes engages in it also, and frequently both birds fly about. Rising deliberately, the male flies over the ground on wide-spread wings which twinkle through a comparatively short arc. He makes his way across the length of his nesting-grounds, then turns to circle it, perhaps again and again. As he flies he utters a mellow, rolling cry, which is pleasingly unlike the racket of the noisy eiders, ptarmigans, and owls. During the course of his performance he may chase the female a good deal, but much of his display seems to be given as a kind of proclamation of health, exuberance, and ownership.

On June 21 at the base of the gravel plateau of Itiuchuk, east of Prairie Point, I found a nest containing four fresh eggs. As I crossed a damp, hummocky meadow, I noticed a Red-back standing on a tuft of grass not far from me. I stepped to one side, and within a short time saw the bird run directly to the nest, a poorly fashioned cup of dry grasses placed between clumps of grass on the crown of one of the hummocks. It was well sheltered from above, and the grass of the lining curled about and above the eggs in such a way as to partly hide them. There was no open water within half a mile, though the ground between the hummocks was damp.

The male bird was incubating, and no female was seen in the vicinity. The male left the nest with a noisy leap, flew rapidly off about fifty feet, then turned and circled, giving his rolling, melodious cry. Straightway he was joined by a White-rumped and a Semipalmated Sandpiper, all of which, in a comical little flock, sped round and round me, doing their best at raising an outcry. After half an hour of observation, I collected the male bird. During this period he did not once go through any broken-wing antics; and the female did not appear.

On the following day in decidedly similar situations I found two more nests, one with one, the other with four eggs. The female flushed from the first nest. At the other nest the incubating parent proved to be the male.

The call-notes were written down as "*cray, cray, cray, cray, cray,*" followed by the liquid, rolling cry, and a "*quée-wee-wee, quée-wee-wee,*" which was given as the birds stood in the grass, and which was not followed by the flight-call.

On June 29 at the edge of the short grass near the beach at Seal Point I collected two solitary males, both of which had been incubating. Both were at almost precisely the same stage of the post-nuptial moult. The lores were almost bare of feathers; pin-feathers were bursting over much of the neck; the distal secondaries and proximal primaries were either missing, or just coming in; the tertials, proximal secondaries, and outer primaries had not yet dropped out. This condition gave the birds, even at a distance, a peculiar appearance in flight. Both these birds were rather fat, and the gonads were somewhat swollen.

On July 7 I saw several solitary birds at the mouth of the Koodlootok River. All were in the moult. I think they were males.

On July 14 about seven miles east of the Post, I came across a female (?) which apparently had been brooding her young. This bird stood on rocks, ran near me, circled me in flight again and again, and yet would make no attempt to gather her family about her, so far as I could see. Finally, by watching the distant tundra with my binocular, I saw one of the youngsters making for its parent, and I ran up in time to discover it, as it crouched. After working about an hour I succeeded in locating two more of the young. Only one old bird was guarding them. It was not moulting. I received the impression that the young were warned not to crouch, but to flee at my approach. When a Duck Hawk sailed over, the parent bird deserted the young, left off scolding me, and joined with a band of other shore-birds in milling about their ancient foe, high in air. On July 27 several isolated birds were seen at points along the shore of South Bay. On July 30 one was seen at the head of South Bay; this bird appeared to have completed the post-nuptial moult of the wing-feathers. I saw a single bird on August 4 on the larger of the Tern Islands. The body was already taking on a blotched appearance, as a result of the growth of gray winter-plumage on the back.

Annual Routine: Flocks of Red-backed Sandpipers return in spring as soon as the crests of the gravel-ridges are free of snow. These flocks fly about for a few days before mating begins. At the time of egg-laying the mated birds repair to the sheltered grassy meadows, sometimes quite far inland, where they frequently are the only species, aside from the Lapland Longspur and Golden Plover, to be seen. Probably both sexes incubate. Our data would seem to indicate that only the males sit upon the eggs;²² but that the females probably remain in the vicinity, for *pairs* of birds are noted irregularly throughout the season. The post-nuptial moult of the males, and perhaps of the females, is begun in mid-summer, before mid-July, and the new flight-feathers of the wing are fully developed by late August. Whether both sexes usually moult at the same time I cannot say. My own observations lead me to believe that, as the males cease incubating, they begin the moult; but that the females delay this moult until the young are more or less able to care for themselves.

By the time the young are well developed, the adults are flocking by themselves. The young in full juvenal plumage, and staying in family-groups, make their way to the beaches, flock with other family-groups, and undertake the post-juvenal moult in mid-August and early September. According to Bent (1927, p. 225) this moult "involves nearly all the body plumage, nearly all of the scapulars, and some of the tertials, but not the rump, upper tail-coverts, or flight-feathers."

The adults may, in general, migrate before the young; but both adults and young are occasionally found late in the fall. I am inclined to think that the autumnal migration of this species from Southampton is decidedly irregular.

The enemies of this species are those of the shore-birds in general. The Parasitic Jaeger is probably its worst enemy during the fall, the Arctic Fox during the summer. The Eskimos pay little attention to it because it is so small.

Fleshy Parts: A sketch of a downy young bird (age uncertain) made on July 14, 1930, shows the following coloration of the fleshy parts: eye, virtually black; eyelids, dull gray; bill, dark gray, almost blackish, with a faint brownish tone on the lower mandible; legs and feet of a dark, rather indefinite shade, perhaps nearest to *deep grayish olive*,²³ with a tinge of dull flesh-color along the sides of the tarsus.

²²It will be recalled that the female flushed from a nest on June 22 was *laying* eggs, not incubating.

²³From Ridgway's *Color Standards and Nomenclature*.

In adults the bill, legs, and feet are blackish, the bill *slightly* greenish or olivaceous at the base.

Other Records: Rae apparently did not take a specimen of this species at Repulse Bay in 1846. Preble (1902, pp. 97 and 98) found it migrating in great numbers south of Cape Eskimo. He says: "They were seen in large numbers wherever we landed on the coast north of Fort Churchill, were present by the thousands on the Barren Grounds south of Cape Eskimo, August 3 to 13, and were still seen, though in diminishing numbers, wherever we landed on the way back to York Factory." Eifrig (1905, p. 239) says: "One adult was taken in July, 1904, at Southampton. Not common." Low (1906, p. 317) says: "Found breeding about Fullerton. Skins and eggs." Mr. Ford remembered having seen it on Coats Island during the summer. Mathiassen did not record it in 1922. Mr. Swaffield did not take it at Mansel Island. Soper (1928), does not include it in his list from Baffin Island. We found it common about Chesterfield during the late summer of 1930 (Sutton, 1931c, p. 158).

Genus MICROPALAMA Baird.

Micropalama himantopus (Bonaparte). STILT SANDPIPER.

One of the outstanding surprises of my year's work on Southampton was that I did not find the Stilt Sandpiper either nesting or as a migrant. I did not see at it Chesterfield either, though I looked for it constantly, and observed one individual of the somewhat similar Lesser Yellow-legs (1931c, p. 158).

A specimen collected by Rae at "Repulse Bay" is recorded in the British Museum Catalogue of Birds. Preble (1902, p. 95) noted "several . . . individuals" on August 12, about twenty-five miles south of Cape Eskimo.

Genus EREUNETES Illiger.

32. *Ereunetes pusillus* (Linnæus). SEMIPALMATED SANDPIPER.

(Plate XVII, fig. 2; Plate XXII, fig. 11)

Eskimo Name: The Aivilikmiut words *Shidgeriak* and *Shidgeriatsuk* are applied rather loosely to various species of sandpipers, more or less as our term *shore-bird* is used. The latter of these words, with its diminutive suffix, is probably the one they use most frequently for this, the smallest of the waders, though it is applied also to the White-rumped and Baird's Sandpipers. The turnstone is never given this name, however, and all the plovers, curlews, and godwits have special names.

The Okomiut have a special name for this little bird, *Livilivilak*. The repetition of the *livi* in this word suggests that it is imitative of some call-note, as is the Aivilikmiut name for the Semipalmated Plover, *Koodilikoodiliatsuk*. I do not recall any cry of the Semipalmated Sandpiper, which suggests the syllables *livi*, but Brandt (see Bent, 1927, p. 245) in speaking of the song, as he heard it in Alaska, likens the trilled "*la-v-la-v-la-v*" to "its native name." Mr. Brandt tells me that this name was *La-vec-la-leber-verg*. The similarity of this word to that used at Southampton by the Okomiut Eskimos is really striking. According to Soper (1928, p. 101), Hantzsck noted that the natives of Baffin Island used the name *Livilivilakulluk*.

Status: The Semipalmated Sandpiper is an abundant summer resident along the coast and also at some distance inland, all over the western half of the Island. According to the Eskimos it is abundant at East Bay and Duke of York Bay; but it is not so common along the steep shores of Fox Channel. I considered it the second commonest bird of the region,

only the Lapland Longspur being a more abundant species. Unlike some of the other shore-birds, which flock densely in migration, but which scatter out during the nesting-period, it is abundant all through the summer, for every suitable meadow has from one to six pairs of birds, and their cries are to be heard everywhere. During migration it is not, at times, as abundant as the White-rumped Sandpiper; but this, I think, is chiefly because the White-rump lingers longer, and it may also be because the White-rump is a larger and more noticeable species.

A series of ten breeding males and three females was taken during the summer of 1930. Some of these birds, the females in particular, are so bright and so strongly red-brown on the head that I was led for a time to think they might be Western Sandpipers, *Ereunetes maurii* Cabanis. I find upon measuring them, however, that they are all too short-billed for *maurii*. Their coloration, nevertheless, appears too bright and too reddish for typical *pusillus*. One bird in particular, a female (G.M.S. No. 3559; C. M. No. 110,125), has so bright an appearance as to suggest its being of a species quite distinct from the drab little Semipalmated Sandpiper, with which we are familiar.

Measurements in millimeters of *Ereunetes pusillus* from Southampton Island.

MALES					
G.M.S. No.	C. M. No.	WING	TAIL	CULMEN	TARSUS
3529	110,095	95	43	20	21
3542	110,108	95.5	43	21	21
3557	110,123	93	42.5	20	21
3558	110,124	94	41	18.5	21.5
3602	.....	93	43	19.5	20.5
3681	110,237	91	42	19.5	22
3682	110,238	94	42	19.5	21
3683	110,239	93	40	20	22
3684	110,240	96	42.5	18.5	21.5
3693	110,249	89	41	19.5	22
Average		93.3	42	19.6	21.3
FEMALES					
3559	110,125	99	44	22	22.5
3603	110,165	98	44.5	22.5	23
3610	110,169	96	40	22	23
Average		97.6	44.8	22.1	22.8

Fall Records: During the late summer and early fall of 1929 Semipalmated Sandpipers were abundant at the Post and all along the southern coast from South Bay to Cape Low. I saw several small flocks on August 17 at Coral Inlet. They were associating with the scattered White-rumped Sandpipers, and were especially common on the small, muddy tidal flats at the head of the little bays and coves between the jutting rocky ridges. They were delightfully confiding, and permitted me to observe them closely. They ran about on the mud, or among the short, thin grass, probing and jabbing in the ooze, resting on one foot, stretching their legs and wings out backward, or lifting their wings prettily over their backs.

I did not see any young birds, the plumage of which showed traces of natal down. A male was shot and a female examined on August 21, and a male was collected on August 22. None of these had any down clinging to the feathers of the chin, forehead, or nape, though all were obviously in their first winter-plumage.

On August 25 great numbers, all, or nearly all, young birds, were seen at Prairie Point. I am inclined to think that by this time the adult birds had departed for the south.

Many young birds were seen and one collected at Hut Cove on September 1; but the

Semipalmated Sandpiper was not nearly so common at this time as the White-rump and Sanderling. A few were seen at Cape Low on September 2 and 3. At Four Rivers hundreds were seen from September 4 to 6. They were only about half as common here as the White-rumps, and I think most of them had by this time followed the adults southward.

On September 7 a few were seen at Four Rivers, among the numerous White-rumps; and six were noted on September 8. Thereafter the species was seen no more, though the other shore-birds persisted for some time. No Semipalmated Sandpiper was noted on the entire trip to Seahorse Point.

Spring Records: When the Semipalmated Sandpiper first appeared in the region of the Post on June 8, 1930, all the birds seemed fairly bubbling over with excitement. They ran about over the rocks, twittering constantly, then sprang into the air to make off on quivering wings, uttering a rolling, musical cry. A male secured on this date was very fat, and the gonads were much enlarged. I cannot be certain that the males arrived ahead of the females, but I do know that all the birds appeared to be performing some sort of courtship antics. Ten individuals were noted on June 8 and about fifteen on June 9. On June 10 scores were seen, and courtship antics were observed everywhere. All over the thawing tundra the birds called and flew about in their gentle, but animated way, mounting to about thirty feet from the ground, then drifting down on tremulous wings. In groups of two, three, and four they ran about, sparring with and chasing each other, spreading and lifting their wings. Sometimes they crept along the grass with their feathers fluffed out, wings partly spread horizontally, and tails fanned and queerly turned up, in an attitude a taxidermist would avoid, lest he be criticized for exaggeration.

On June 11 two males and a brightly colored female were collected, the ovaries of the latter greatly enlarged. Mating is thus probably consummated very soon after the birds arrive. In fact, for all I at present know, most of the birds may be mated when they arrive, though the courtship antics are carried on for some time.

A good deal of this peculiar demonstration, which we usually call 'courtship,' may be merely an expression of exuberance of spirit; and not, as is often supposed, an attempt to attract the females. These little "peeps," for instance, were all obviously mated by June 12. Yet they continued chasing each other about, not only one bird his mate, and so on, but all the mated pairs, in a comically free-for-all fashion. On June 13 I saw a male bird chasing a Snow Bunting. He spread his wings, puffed out his feathers, rushed at the bunting in a very formidable manner, and actually jabbed him with his beak. This, obviously, I should say, was in a defense of the nesting-ground of the Semipalmated Sandpiper.

Females collected on June 15 and 16 had already deposited part of their eggs, and large, partly formed eggs were found in the ovaries.

The first nest containing a full set of four eggs was found at Itiuachuk on June 19. I did not see the female leave the nest, but I happened to see her scuttling through the grass to one side of me. Retiring behind a convenient boulder, I watched her return by a somewhat circuitous route to her eggs. When I came up she ran off, then fluttered up with tail spread widely and pressed down, and wings flopping peculiarly. The nest was made entirely of tiny, rounded leaves of one of the dwarf willows. The eggs were lying pointed ends downward; and they were so protectively colored that it was almost impossible to see them, partly covered as they were with the willow-leaves, even when I stood directly over them. This nest was situated on a low gravel-ridge, which extended across a wet grassy meadow. The eggs were fresh. Another nest, containing only two eggs, was found on the same date.

From June 20 to 25 inclusive, I found twenty-one nests of this species without once trying to locate one. As I crossed meadows the birds flew up ahead of me and I had but to look down upon the eggs. The incubating birds practically always leaped directly from the nest, at very close quarters, and their peculiar squealing and feigning of injury gave them away immediately. The attitudes assumed at such a time were amusing. The spread tail was usually pressed downward and to one side so that the bird flew as if wounded badly in the abdominal region. Having trailed to the grass, the pitifully squealing creature usually lay on its side flapping its wings; or, running along like a mouse, with wings partly spread and tail pressed against the ground, gave itself over to spasms of squeaking and wing-beating.

Most of the nests were placed in relatively dry situations, either at the edge of, or on "islands" in the wet meadows. They were made principally of willow-leaves; but in some there were also grass-blades and bits of lichen. One was placed in a neat depression, almost devoid of any lining, at the edge of a great, flat rock not far from the Post. Some of the nests were placed in such low situations that floods destroyed them. On June 27 I collected sets from two such nests, which had been deserted.

On June 21 I saw a pair building their nest. The birds picked up tiny willow-leaves from the ground, ran them through their bills, dropped them, then picked them up again. Both birds gathered material and brought it to the little hollow, which had been chosen; but the female (at least the larger bird) appeared to be more concerned in the enterprise than the other. The leaves were brought from a short distance. All were gathered singly; and the birds ran, and did not fly, to and from the nest.

On June 24 I found a nest containing four eggs *less than ten feet* from a Lapland Longspur nest with five eggs, and about thirty feet from a White-rumped Sandpiper's nest with four eggs. All these birds appeared to live side by side amicably. But as a general rule there was a good deal of quibbling and animosity among the various species of shore-birds, especially when their nests were being disturbed. Red-backs and Semipalmated Sandpipers were constantly chasing each other about; and the White-rumps often entered these pursuits, adding their lisping *tsch, tsch*, or even their peculiar courtship noises to the general commotion. None of the birds, so far as I observed them, ever came to actual blows.

On June 28 I collected four male Semipalmated Sandpipers. Judging from the bare spots on the bellies I think all had been incubating. I found four nests on this date also. In one of these the eggs had been broken, perhaps by a dog. The embryos in all were large. From June 30 to July 7 inclusive, I located seventeen more nests. Two of these had and continued to have only three eggs. I watched some of the nests long enough to make certain that both sexes incubate the eggs, and that both exhibit equal concern over the welfare of their offspring.

On July 8 I found a set of four eggs, which were already pipped. Later in the day I visited a nest (the full set in which had been completed on June 20) and found that two of the young had hatched. The period of incubation, therefore, was eighteen days. On July 8 and 11 I collected downy young just hatched. The parent birds scolded ceaselessly while I was near their young, running about in an agitated manner, sometimes calling loudly. If I gave them a chance to brood they continued their scolding energetically while actually covering their young. On July 11, as I crossed a little wet meadow, I was escorted and besieged by no less than six voluble parents, who varied their tirades against me with occasional battles among themselves. On July 12 and 14 every nest I visited was empty. It seemed that all the young had hatched simultaneously, and everywhere were running about on their strong feet through the grass. Their fluffy little bodies wobbled a good deal at times,

as they stumbled along, but they covered ground with remarkable speed, and it was not easy to capture them. So numerous were the birds that, as a rule, I was constantly escorted by one pair or another of scolding parents from the moment I left the Post, until, after a walk of six or eight miles, I returned.

On July 16 I collected a downy young male, the primary feathers of which were already pushing out. On July 21 I caught and examined a young bird, which was just coming into its juvenal plumage. Down adhered to nearly all the feathers. It could not fly. On July 23 Keetlapik's son brought me three very small young (evidently just hatched) which I did not need. I gave the little Eskimo a sack of candy to pay him for taking them back to their parents; but the chances are nine to one that he ate the candy and dashed the downy babies on stones or hung them up by their feet with deer sinews to watch them die. Such is the need for a thrill in a land where there are no movie-shows!

On July 24 I collected a young bird, which could fly from ten to fifteen feet at a stretch. I was surprised upon examining the heavy, flabby wings, that the little creature had flown as well as it had.

By this time in the most mysterious manner, and without any apparent attempt at flocking, the adult birds had for the most part disappeared. No moulting individuals were seen anywhere. Half-grown young were to be seen wandering about the damp spots at the edges of the lakes or working their way through the grass, apparently headed for the beaches. By the time the young birds had made a few short flights they were practically rid of their down; and soon their wings were strong. They were, however, amusingly unsuspicious and did not seem to want to fly, even when openly chased.

From July 30 onward practically all the Semipalmated Sandpipers I noted were in full first winter-plumage. During the first few days of August they did not fly about in flocks; but by August 8 they were banding together and flying along the beaches as if preparing for migration. Among these flocks there were, however, no adults.

Annual Routine: I believe that the male Semipalmated Sandpipers usually arrive in advance of the females in the spring. The moment the females arrive courtship begins, and soon the nesting sites are selected and the eggs laid. The nest is usually situated on a dry spot in a meadow, or along a low gravel-ridge, not far from water. It is usually somewhat sheltered with grass or with stunted willow-bushes, and is made of grass, bits of moss, and willow-leaves. The eggs number three or four. Both sexes incubate and take an equal interest in defense of the eggs and young. The period of incubation is about eighteen or nineteen days. Only one brood is reared during a season. The young birds grow very rapidly. By the time they are almost ready to fly they run about through the marshes by themselves. Their parents have left them, headed for the southward. I did not see or collect an adult in the post-nuptial moult anywhere on the Island, so it may be that this moult is carried on more or less *en route* southward, or in some favorite congregating ground, which I did not happen to visit. The young birds wander toward the beaches as soon as they have learned to fly. They feed in family-groups. They depart for the south earlier than the White-rumps, Red-backs, and other small shore-birds, and have usually entirely disappeared by the time of the first autumnal snows.

The principal natural enemy of the Semipalmated Sandpiper is undoubtedly the Parasitic Jaeger. Its other enemies are the same as those of the other shore-birds. The Eskimos pay no attention to its eggs for they are very small.

Fleshy Parts: In a sketch of a living, newly hatched downy young bird, made on July 16, 1930, the following coloration of the fleshy parts is to be noted: eyes, black; bill, feet and

legs, and eyelids about the same shade of dull gray, perhaps between *mouse gray* and *deep mouse gray*.²⁴ In the adults the eyes are very dark brown, almost black. The bill is dead black with a slight olivaceous cast, which is scarcely perceptible even in the hand; and the feet are dull black, with a faint hint of olive-brown on the sides of the toes and along the back of the tarsal region.

Other Records: Lyon (1825, p. 47) includes "sandpiper" among the species he noted on Southampton, but there is no way of determining which species he actually encountered. Rae apparently did not take it at Repulse Bay in 1846. Preble (1902, p. 97) saw "immense flocks on the Barren Grounds south of Cape Eskimo" during mid-summer. Eifrig (1905, p. 239) says: "Very common, as are also their nests. A set of two eggs, which Mr. Low thinks is referable to this species, has the ground-color whitish, with an almost imperceptible bluish tinge, heavily dotted, blotched and washed with umber, brown, and faint lilac. Spots larger at the larger end. . ." Low (1906, p. 317) says: "Common everywhere in Hudson Bay. Skins and eggs from Fullerton." Captain Comer took a set of eggs on Southampton on July 7, 1905.²⁵

Mathiassen did not record it in 1922. Mr. Ford noted it as common at Coats Island. Soper (1928, p. 101) says: "this species appears to be very scarce on Baffin Island." Mr. Safffield did not take a specimen at Mansel Island in 1929-30 (Sutton, 1932a, p.42). We saw a good many in the Chesterfield region in the late summer of 1930, but did not collect a specimen (Sutton, 1931c, p. 158).

Genus TRYNGITES Cabanis.

Tryngites subruficollis (Vieillot). BUFF-BREASTED SANDPIPER.

This species was not recorded at Southampton or at Chesterfield. A specimen is said to have been taken at Repulse Bay, however, by Rae, one from this region being accredited to him in the British Museum Catalogue of Birds. Preble (1902, p. 99) says: "I saw a number on the higher parts of the tundra 25 miles south of Cape Eskimo, August 10 to 13 . . ."

Genus LIMOSA Brisson.

33. *Limosa hæmastica* (Linnæus). HUDSONIAN GODWIT.

Eskimo Name: I did not hear any Aivilikmiut or Okomiut name for this rare species.

Status: A very rare summer resident in the high interior, and a rare and irregular migrant along the southern coast, where it is apparently much commoner in the fall than in the spring. It was seen in mid-summer only once, on the high limestone-gravel plateau at Itiuchuk, nine or ten miles in from the coast and well above the coastal lake-belt.

Fall Records: On August 25, 1929, two males in perfect first winter-plumage were collected along the edge of a small, shallow, moss-lined pool at Prairie Point, where they were feeding quietly. They walked in the water up to their bellies, taking long strides as their heads moved back and forth. Occasionally they stood still, like Greater Yellow-legs, jerking their bodies stiffly. Their call-note was a low *quip*. Their stomachs were well filled with remains of crane-flies and other insects, which they had evidently been finding near the water, and with gravel. They were not very fat.

On September 2 I took a female in first winter-plumage at the marshy head of a lake, through which the Ranger River flowed, near Cape Low. It was disturbed, though not

²⁴Ridgway's *Color Standards and Nomenclature*.

²⁵Dr. Bishop informs me that a parent bird was forwarded with this set.

actually chased, by the many Pomarine Jaegers which flew by. It swept by me several times before alighting, and lifted its wide wings daintily each time it alighted. It was not fat. The stomach contained a little vegetable matter, some insect remains, probably Diptera, and a little gravel. Amaulik Audlanat, who examined this specimen freshly killed, said he had seen such a bird only a few times either on Southampton or at Repulse Bay.

Spring Record: On June 22, 1930, as I was crossing the exceedingly barren gravel- and angular-limestone stretches of the plateau at Itiuachuk, I saw one Hudsonian Godwit in magnificent summer-plumage. I think the bird must have been nesting in the vicinity. As it flew by me, I noted its deep liver-red underparts and its long bill. Its call notes I wrote down as a "grating *toy, toy, toy.*" I have not seen in the literature at hand any reference to such a note. I followed the bird for some distance, but did not see its mate.

Annual Program: If the Hudsonian Godwit nests on Southampton, it is only in the upland interior. The young birds make their way down to the coast and linger about for a time without their parents before migrating.

Fleshy Parts: In my field-notes covering the immature specimens collected I wrote: "The bills are purplish flesh-color below, brownish above. The feet and legs are dull blue-gray. The irides are deep brown, almost black."

Other Records: This species evidently is rare in the region. Kumlien (1879, p. 40) recorded two birds at Cumberland Sound, Baffin Island, in September, 1877. Rae in 1846 took a specimen at Repulse Bay, which is recorded in the British Museum Catalogue of Birds. Preble (1902, p. 97) found it "common on the Barren Grounds south of Cape Eskimo, August 4 to 8." Neither Eifrig (1905) nor Low (1906) mentions the species. Mathiassen did not record it in 1922. Mr. Ford did not remember having seen it at Coats Island. Soper (1928, p. 101) did not see it on Baffin Island. Mr. Swaffield did not take a specimen on Mansel Island (Sutton, 1932a). We did not see it along the west coast of Hudson Bay during 1930 (Sutton, 1931c).

Genus *CROCETHIA* Billberg.

34. *Crocethia alba* (Pallas). SANDERLING.

Eskimo Name: Occasionally this species was called *Shidgeriak Kadlouktuk*, the "white one who walks the beach." *Shidgeriak*, of course, is the name given to shore-birds in general.

Status: Since young specimens were taken, in which a considerable amount of natal down adhered to the feathers of the head, and since the Eskimos have seen the species throughout the summer several times, I believe the Sanderling nests, probably in the western part of the Island, and very likely most commonly along the shores of Sir Thomas Roe's Welcome from Cape Kendall northward.

We noted it principally as a fall migrant, commonest near Cape Low, not so common in the region of Leyson Point. We did not see it in the spring. At Chesterfield it was one of the most abundant migrants in the fall.

Fall Records: I first observed this easily identified species at Four Rivers, on August 27, 1929. It was represented by a single bird, which appeared to be in juvenal plumage. On August 29 at Hut Point many were seen. All these were in juvenal and not in changing adult-plumage, and they seemed to be going about in groups of three or four, as if the broods were staying together. Amaulik Audlanat, upon seeing these birds, told me that he had seen them nesting a short way inland at this same place several years before. On August 30 and 31 about two hundred were seen at Hut Point, where they fed chiefly among the rotting beds of seaweed.

On September 1 at Hut Point the first adult Sanderlings were seen. These I recognized instantly by their reddish, somewhat blotched breasts and throats. Among the two hundred birds seen, only three were obviously adults, and these were all in the midst of the post-nuptial moult.

On September 2 and 3 several were seen at the mouth of Ranger River and in the vicinity of Cape Low. All these seemed to be in juvenal plumage.

On September 4 a few were seen among the flocks of other shore-birds at Four Rivers, where, in contrast to the gray-colored White-rumps and Semipalmated Sandpipers, they appeared decidedly white. I wrote down the characteristic call-note, which I heard them give, as *chick, chick*. On September 5 many young birds were observed, but no adults; I collected two juvenal males, which seemed not only to be a trifle under-sized, as if not yet full-grown, but which also had on their heads, especially in the region of the throat and forehead, considerable traces of natal down. I noted on this date that the Sanderlings were not feeding with the other shore-birds in the muddy places, or in the beds of seaweed, but on the sandy beaches, especially those which lay far out on the exposed points. Here the pretty birds ran along in little companies at the very edge of the water, chasing out through the wet sand in the very wake of a receding wave and running back again as the water returned, sometimes so tardily that they got their bellies wet or even had to swim in to reach firm ground. On September 6, 7, and 8, a few were noted daily in the vicinity of Four Rivers. They tended to keep in flocks by themselves. No adults were seen.

On September 19 near Leyson Point three adult birds with decidedly reddish, blotched heads were seen on the outer beach. I did not collect these, because I was having so much trouble in preparing specimens on our overcrowded boat. On September 20 about a dozen were seen on the sandy beach not far from the mouth of the Anderson River. These birds spent part of their time with a flock of White-rumped Sandpipers, but seemed to prefer to feed by themselves. On September 21 six were seen near the mouth of the Anderson River. No Sanderling was seen after this date.

Spring Records: I did not note this species during the spring and summer of 1930 in the vicinity of South Bay. Amaulik Audlanat and others, however, had seen it in spring and summer during previous seasons, and Tommy Bruce told me that he saw some which acted as if they had nests, in the region of Cape Low and Cape Kendall. It is known to nest in the Cape Fullerton region to the west of Sir Thomas Roe's Welcome, so I believe that it also occurs in mid-summer on Southampton, probably in considerable abundance in some sections.

Annual Routine: Since I did not see this species during the spring or summer, I cannot offer any data as to courtship and nesting activities. In the fall the young birds, still with traces of natal down on their heads, make their way down to the coast, where in family-groups they feed with the other shore-birds until later in the season, when they go to the outer sandy beaches and feed more or less by themselves. At this time they are not accompanied by their parents. Before they leave the Island they have just begun their post-juvenal moult, but this stage apparently never involves any of the flight-feathers of the wings. Most of the adults may move southward before the young, but adults were noted quite late in the season both in 1929 and in 1930 at Chesterfield, so I am inclined to think that both young and old birds may occasionally move south together. The post-nuptial moult of the adults is at its height, insofar as the body plumage is concerned, while the birds are feeding along the southern coast of the Island, preparatory to leaving. I did not see any individuals, however, which showed any trace of the moulting of the primaries or secondaries.

The natural enemies of this species are the same as those of the other shore-birds during the period of the fall migration. The Parasitic Jaeger and Duck Hawk, on the whole, are probably their most serious enemies at this season.

Other Records: According to Hutchins (*cf.* Swainson and Richardson, 1831, p. 336) this species breeds on Hudson Bay south as far as the fifty-fifth parallel. A specimen collected at Repulse Bay by Rae is recorded in the British Museum Catalogue of Birds. Kumlien (1879, p. 87) saw a small flock at Cumberland Sound, Baffin Island, in September, 1877. Preble (1902, p. 97) saw a number twenty-five miles south of Cape Eskimo on the morning of August 13. "They were flying southward with other species." Eifrig (1905, p. 239) says: "Common; one taken at Fullerton, June 16, 1904." Low (1906, p. 317) says: "Found breeding about Fullerton. Skins and eggs from Fullerton." Mathiassen did not record it in 1922. Mr. Ford did not recall having seen it on Coats Island. Bent (1927, p. 274) includes in the breeding-range "eastern Franklin (Igloodik and Winter Island)" and Cape Fullerton. Soper (1928, p. 101) did not see it on Baffin Island. Mr. Swaffield did not take a specimen on Mansel Island (Sutton, 1932a). At Chesterfield Inlet we found the Sanderling one of the most abundant migrant shore-birds in the late summer of 1930. Many of the birds seen were adults in the post-nuptial moult. Representatives of the Hudson's Bay Company located at the Chesterfield Post did not recall that they had ever seen the species in summer (Sutton, 1931c, p. 158).

Family RECURVIROSTRIDÆ.

Genus RECURVIROSTRA Linnæus.

Recurvirostra americana Gmelin. AMERICAN AVOCET.

Kumlien (1879, p. 84) includes this species in his list from Cumberland Sound, Baffin Island, basing the record upon an Eskimo drawing of the bird (See Soper, 1928, p. 97). It has not been listed by any other observer.

Family PHALAROPODIDÆ.

Genus PHALAROPUS Brisson.

35. *Phalaropus fulicarius* (Linnæus). RED PHALAROPE.

(Plate XVII, fig. 1; Plate XXII, fig. 4)

Eskimo Name: The only name I heard the Aivilikmiut give this species was *Shiakuk* or *Shoukuk* (etymology unknown). Mr. Brandt tells me that the Alaskan Eskimos call it *Houk-twak*. Soper (1928, p. 96) gives the name in use in Baffin Island as *Shutgak*.

Status: An abundant summer resident, chiefly in the flat prairie-country to the west of South Bay. The Eskimos told me it was common also at East Bay and Duke of York Bay. In the vicinity of the Post and at Prairie Point it was one of the commonest summer-birds. It was less common at Seahorse Point. At Chesterfield it was rather rare, being less common than the Northern Phalarope, a species which is very rare on Southampton Island.

Fall Records: I think that we did not see a single adult Red Phalarope at Southampton during the late summer and fall of 1929. Certainly all the specimens secured were young birds, and I am inclined to think the old birds had left the lakes by the time the young were able to fly and had made their way out to favorite congregating grounds near salt-water, where they were undergoing the post-nuptial moult into the gray winter-plumage. We

saw birds at sea, which probably were adults; but the thousands of phalaropes seen inland were young.

On August 17 many young birds were seen swimming about at the edges of the lakes, or in shallow puddles along the beach at Coral Inlet. They especially frequented the grassy, stone-lined margins, where among the bubbles and foam they bobbed lightly on the waves, twisting about nervously, dabbling for food. As I came up, they flew up noisily, fluttered along for a rod or so, then plumped into the water to renew their search for food. Their conversational call-note I wrote down as *choo-kil*, given in a soft voice. As the birds flew up, their wing-beats were distinctly audible.

On August 18 I saw a flock of ten swimming at the edge of broad slippery rocks, in the salt-water. They were eating small snails, which they snatched from the rocks. Sometimes they had to dive almost out of sight in gathering their food, but they went under with difficulty. They swallowed the snails entire, shell and all, and owing to the smallness of their mouths, sometimes had trouble in getting them down.

On August 19 three juvenal specimens were secured. One of these was killed with a pebble by an Eskimo boy; all had traces of natal down on the head, principally on the forehead and chin. On August 20 another young bird (not fat) was taken. I observed hundreds of the birds, as they fed in the deep grass, which grew along the edge or between the shallow lakes. They slipped along among the blades, paddling rather noisily, and giving their anxious call-notes, but only rarely coming out into the open. Sometimes a dozen birds would be hidden thus in the margin of one small pool; and they would leap up ahead of me with an explosive fluttering of wings.

On August 23 many young birds were seen in the pools inland and along the bays and coves. I noted two birds which appeared to be trying to dive under a large, flat rock at the edge of a lake. Call-notes heard on this date were a simple *weet* or *peet*.

On August 25 thousands of young Red Phalaropes were seen in the big lakes at Prairie Point. They sat about on the water in closely bunched flocks, resting, preening, and bathing, sometimes crawling out upon the little mud-bars to stand on one foot for a time. When approached too closely, groups of them would flutter up, fly a few yards, then drop into the water. They swam very lightly, the forepart of their bodies scarcely sinking at all into the water, and the tail being carried rather low. When excited they frequently dipped their bills into the water as if contemplating flight. A few birds were seen in the inland pools, but most of them were not far from the salt-water. All seemed to be in complete juvenal plumage. There were no traces of down on the head, and the post-nuptial moult into the first winter-plumage apparently had not yet started.

A few Red Phalaropes, which may have been adults, were seen in the middle of South Bay, about four miles from land, on the same date. I did not collect any of these birds, but thought from their blotched appearance that they were adult males in the midst of the post-nuptial moult. There may also have been some adult females with them.

The species was recorded daily on our trip to Cape Low. On August 28 a fair-sized flock, which I think were adults in the moult, were seen at sea. On August 31 great flocks were noted along the shores of the large, grass-lined lakes, where they mingled with the rafts of young Old-squaws and King Eiders. More flocks of moulting adults were seen at sea between Hut Point and Cape Low on September 1. On September 2 at Ranger River, a few were seen on the inland pools, and fine, high whistling sounds were heard from them, as well as the characteristic *pheep* or *wheet*.

On September 4 many were seen at Four Rivers. On this date the peculiar whistling cry

was heard again as well as a sucking *whew* or *phew*. They were much tormented by the numerous Parasitic Jaegers. On September 5 one was noted as it twirled about in a little pool of water in a bed of seaweed. The pool was so small the bird had scarcely room enough to keep afloat. It trod its feet energetically, its bright eyes directed intently downward.

I never saw a jaeger of any sort actually catch a Red Phalarope, but I found the un-plucked, headless body of one in the stomach of a female Parasitic Jaeger shot on September 7 at Four Rivers; and the jaegers pursued the phalaropes, whenever they had opportunity. On September 9 and 10 flocks were seen at sea, some of them not far from the Post. As our motor-boat drew near, they swam about nervously in circles, then finally flew away. When the birds swam straight away at top speed, the fore part of their bodies rose very high in the water.

Phalaropes have such thick, air-filled plumage that they dive with difficulty. I saw several birds on September 11 feeding along the edge of the Inlet, diving for their food in water about eight inches deep. They rose from the water for an instant, spread their wings, and fluttered a little before making the plunge, apparently to give them momentum. When they had dabbed their bills on the bottom they popped up to the surface like corks.

During mid-September I noted Red Phalaropes feeding diligently during snow-storms. I saw a large flock at sea on September 12, and another compact flock on an inland lake. On this date a Duck Hawk was seen chasing one. The sociable, friendly birds were common along the beach not far from the dwelling of the Post, where we lived. From the dining table in our kitchen we could see the birds, as they patrolled the puddles along the shore.

On September 16 at Seal Point I shot six immature specimens, two females and four males, which were in the height of the post-juvenal moult. The gray plumage of the back was noticeable even in the field. I did not see any adult birds anywhere among the large flocks.

On September 18, 19, and 20, masses of parti-colored birds were seen at sea about ten or twelve miles from shore. I think these were immature.

On September 22 and 23 many were seen at Seahorse Point, where they frequented the narrow beaches strewn with seaweed, or rested in the shelter of stranded chunks of ice. Small flocks were also noted at sea, where they seemed quite at home among the great waves.

The last flocks were seen near Native Point and at Coral Inlet not far from the Post, on September 27 and 28 respectively. On October 2 one was seen flying southward not far from Seal Point.

Since this bird is known to be rather strictly a maritime species during migrations, it would be interesting to know whether the Southampton birds move eastward through Hudson's Straits to the Atlantic Ocean and thence southward; or, whether they move southward in Hudson Bay, then fly overland to the Atlantic or the Gulf of St. Lawrence. I have no data, which would lend color to either theory, save that at Chesterfield and to the south along the entire coast of Hudson Bay during the fall of 1930, the Red Phalarope was so exceedingly uncommon, that I felt certain the autumnal migration could not be taking place along this coast (Sutton, 1931c, p. 158).

The post-juvenal moult affected first the plumage of the back, the gray feathers showing prominently among the yellow-brown plumage, which was dropping out. As has been pointed out by Bent (1927, p. 8) and others, this moult includes only the contour-plumage and does not affect the wings and tail.

Spring Records: Certain of the Okomiut hunters reported to Father Thibert that flocks

of Red Phalaropes in bright plumage were seen near Munnimunek Point in the open water at the edge of the floe as early as May 19, 1930. We did not see any phalaropes during our several trips to the floe.

On June 6 Santiana saw one flying about at the mouth of the Koodlootok River, apparently searching for open water, upon which to alight.

On June 10 three miles east of the Post I saw two females in beautiful bright plumage, swimming about in the shallow water, which had gathered on the ice on a small lake. These birds made a pretty sight indeed as they floated about, their rich plumage and yellow bills gleaming against the clear blue background of the water-covered ice. They bathed a little, looked for food along the edge of the ice for a time, then rose and whirled rapidly away. On June 11 a flock of females were seen darting over one of the large lakes, where the ice had partly melted. No male birds were seen.

From the above data it appears that the female Red Phalarope returns to the nesting-ground earlier than the male. Since the female is known to be the aggressor in courting and mating, it is not surprising that the procreative urge should drive it back to the nesting-grounds more rapidly than it does the male.

On June 12 a male and female, apparently a mated pair, and both with gonads much enlarged, were shot at the mouth of the Koodlootok River. Both these birds were fat.

On June 13 phalaropes were abundant inland. The lakes were not yet thawed, to be sure, nor had the snow completely disappeared, but in all the marshy spots phalaropes were to be seen, swimming about daintily on the little pools, threading in and out among the grass, or resting in companies on the edges of the ponds. As I walked across the tundra, phalaropes rose constantly, their wings making an explosive flutter as they leaped from the grass, their wheezy *phewp*, or *phu-eep* call-notes, and sharp *weet*, *weet* cries of alarm sounding in all directions. Most of the birds were very tame. They seemed to be paying more attention to each other than to getting food, though part of the time they twirled about at the water's edge, with bills directed downward, ready to be thrust at any edible object, which might appear.

On June 15 I saw hundreds everywhere in the lakes about the Post, and shot seven specimens, four males and three females, all of which were fat and in excellent plumage. One of the females had already deposited an egg. The gonads of all were much enlarged, and I saw much courtship activity. The females, as has been noted by many authors, appeared to take the lead in these demonstrations, swimming about and toward the males, and even, at times, thrusting their bills at them. The males also indulged in some pretty antics, flying above the females and dangling for an instant in mid-air, while calling *phewp*, *phewp* and giving whistling cries. When the male alighted once more in the water both birds twirled about a great deal, bobbing their heads, dipping their bills, and then swimming about side by side. On June 16 and 17 these mating birds were to be seen everywhere on the little lakes.

On June 18 I found the Red Phalarope decidedly the most abundant bird at Itiuauchuk. They continued their mating until about June 21. I spent part of the afternoon of the 18th photographing a pair, which were feeding along the margin of an upland lake about half a mile back from the coast. I crept along behind them, or ran in front of them, and waited until in their meticulous inspection of the shore they came abreast of me. They were very energetic in their feeding, thrusting their bills viciously into the mud, and hauling out with a great deal of gusto what appeared to be some large sort of worm. Occasionally they "stood on their heads" or "tipped" in the water. They usually stayed about three feet out from the shore during this hour's period of feeding. For the most part they were silent.

On June 21 I watched many pairs mating and at one time saw two females chasing one male. I found a nest containing three eggs in a dry spot in a marsh between two lakes. The female flushed from this nest. She flew straight upward for about three feet then darted away, alighted, and scuttled about through the grass, head bobbing nervously. The nest was shabbily constructed of grasses; and the vegetation about it had been drawn into a sort of canopy.

On June 23 I found a nest containing four eggs in a little swale at the head of one of the upland lakes at Itiuchuk. The male was incubating. The nest was poorly constructed, and the grasses stuck up between and among the eggs in a disorderly manner. On June 24 and 25 no mating activities were noted, and on the whole the females were not nearly so much in evidence as they had been during the preceding week.

On June 27 I collected a nest and four eggs near the Post. Though the male bird was incubating, *the female was nearby*, and the two birds called anxiously while I was at hand. On June 28 I saw several nesting pairs at Seal Point.

On July 1 I saw a flock of ten females flying out over the salt-water toward a rocky islet at Seal Point. This was the first definite evidence of desertion of the males and nests by female birds. While some of the females thus probably leave all domestic duties to the males, others certainly stay with their mates; though I did not observe any female birds actually incubating.

On July 6 I found a nest containing a complete set of three eggs. I had noted a male bird at the edge of a grassy pool. He peeped loudly as I came near. I sat down not far away and watched. He swam rapidly toward the edge of the pool, walked quickly through the high grass, then, after standing long-necked to eye me for a while, retraced his steps to the water's edge, returned to the high grass again (this time by a different route) and suddenly disappeared. I went up and easily found the nest.

On July 7 I found a brood of four newly hatched young with the male parent near the mouth of the Koodlootok River. Two of these, a male and a female, I collected. The male threw himself about at my feet, with wings widely spread, calling in a wheezy voice. He did not, however, go through any broken-wing demonstrations. On the same date one of the Eskimos brought in a set of four eggs, which were so heavily incubated that they could not be saved.

On July 8 three broods of young were found; one of these was accompanied by the male and female; the others were guarded and brooded by the male alone.

On July 9 the nest found on July 6 appeared to be deserted. Later in the day, however, I returned to find the eggs hatching.

On July 12 I watched four pairs of adults which had young. They walked with their offspring through the deep grass near a lake at Seal Point. Every time I stood up, all the old birds flew from the grass toward me, and called in their queer, windy voices *pheep*, *pheep*, or *phu-eep*, *phu-eep*. When I sat down, they swam back to the young calling *phit-ick*, *phit-ick*, as they bobbed along. Their method of alighting in the water was comical. Often they closed their wings when a foot above the water and dropped in noisily, with a distinctly audible *plop*.

On July 15 I found a male and one newly hatched downy young in a grassy swamp near the Post. This bird was amazingly bold. When I caught the young one the male flew near me, running across my foot, and calling *phu-eep* plaintively. I caught him in my butterfly net twice, but this did not frighten him. He brooded the young, which I held in my hand. In trying to secure a good photograph, I tied the young bird to a twig. The father came up

to the youngster but would not cover it. Standing bolt upright, with plumage stuck out all over his body, he called to the baby, evidently expecting it to crawl into the brooding patches of the belly.

On this same date I saw a male and female brooding their young not far away. During mid-July male and female birds were seen together several times.

Judging from these data I should say that our idea of the home-life of the Red Phalarope is on the whole somewhat erroneous. While the male certainly does all, or the greater part, of incubating, certainly the female frequently assists in caring for the brood. The flock of females seen on July 1 may have been non-breeding birds.

On July 23 four dead downy young were found by an Eskimo boy. On July 30 I saw a solitary, half-grown bird swimming alongside a female King Eider, heading toward the middle of a large, rather deep lake.

On August 2 I noted that all adults observed were worn and faded in appearance. One male bird in particular was almost a dirty orange-color. It appeared to be in the post-nuptial moult. On August 4 small flocks of moulting males and females were noted near Bear Island.

Annual Routine: The female Red Phalaropes take the lead in courtship and may at times arrive in advance of the males. The nest, which probably is made by the male, is crude, the lining being of curly grass, which sticks up all about and among the eggs. The cup is narrow and the eggs, with their small ends pointing downward, fill it completely. Nests as a rule are built in low, grassy country in a rather dry spot. The eggs number three or four. Incubation is carried on almost exclusively by the male, though the female may assist in these duties to a limited extent. Upon occasion she lingers near the nest, much as the male in most species lingers near his mate, while she broods. The young are cared for *as often by both parents* as by the male alone. In fact, as a rule, both male and female brood the young and lead them about. Both parents show about equal concern for their progeny, though the males are apparently bolder in defending them in the face of danger.

The post-nuptial moult of the adults, which begins when the young are about half-grown, is not completed inland. Before the birds begin losing their flight-feathers they move out to the salt-water, where they congregate at some distance from the shore. Both sexes probably gather in these flocks.

The young birds begin to gather in large flocks while in full juvenal plumage. They begin their migration while still in the post-juvenal moult, which does not, of course, affect the flight-feathers. Adults and young probably migrate separately.

Other Records: A specimen listed in the British Museum Catalogue of Birds is said to have been taken at Repulse Bay in 1846-47 by Rae. Kumlien (1879, p. 85) found it on and about Baffin Island. Preble (1902, p. 93) mentions it as "fairly common on the shallow ponds below Cape Eskimo, August 3 to 8, at which time they were feeding downy young."²⁶ Eifrig (1905, p. 238) says: "This was very common around Fullerton and Southampton. The skins of five adults and two immature specimens were brought back, taken at the above place in June and July, 1904. They nest around fresh-water ponds, laying their eggs, without nesting material, in depressions in the sand or moss, often in lichens. A set of four eggs was collected July 2, 1904, at Southampton."

Dr. Bishop tells me that in his collection there are nine eggs and one "untagged skin" said to have been taken on July 7, 1905, at Southampton, by Captain Comer. Captain Comer called these "Whale-birds."

²⁶ Preble's statement is indeed interesting. We never observed any such feeding of the young by the parents.

Low (1906, p. 317) says: "Very common about Fullerton and on Southampton Island, breeding in swampy ground. Skins and eggs from Fullerton and Southaimpton."

Bent (1927, p. 14) includes "Southampton Island and Cape Fullerton" in the breeding-range of the species, probably on the strength of the above statements. Soper (1928, p. 96) found it fairly common on Baffin Island. A specimen was taken by Mr. Swaffield on Mansel Island, where it probably nests (Sutton, 1932a, p. 42). Mr. Ford found it common on Coats Island. We noted it as decidedly uncommon at Chesterfield in the late summer and fall of 1930 (Sutton, 1931c, p. 158).

Genus LOBIPES Cuvier.

36. *Lobipes lobatus* (Linnæus). NORTHERN PHALAROPE.

Eskimo Name: Amaulik Audlanat told me that this species was called *Shiakuk* or *Shoukuk*, the same name given to the Red Phalarope. He hastened to explain to me, however, that this bird was different from the real *Shoukuk*, but that he knew no better name for it. According to Soper (1928, p. 96) the Eskimo name in use on Baffin Island is the same as that for the Red Phalarope (*Shutgak*).

Status: A rare and irregular summer resident, known only from the southern and south-western parts of the Island. It has never been seen in the high eastern part.

Records: During mid-June, 1930, the Eskimos encamped at Native Point observed a pair of these dainty birds day after day in the shallow pools. The nest was not found, but the natives thought the eggs had been laid. The female was killed with bow and arrow by one of the children on June 23 and brought to me (in a neatly wrapped package) so many days later that I could not save it as a skin, but had to place it in formalin. It was in handsome, full plumage. No other individuals were seen during 1930.

The Eskimos told me they had seen the species several times, principally in the region of Cape Low, and that it nested wherever it was found. We found it a common bird across Sir Thomas Roe's Welcome, in the Chesterfield section (Sutton, 1931c, p. 158).

Other Records: Lyon (1825, p. 47) mentions "*Tringa lobata*" among the species he noted. Rae apparently did not take it at Repulse Bay. Kumlien (1879, p. 84) found it breeding at Cumberland Sound, Baffin Island. Preble (1902, p. 94) recorded it as abundant on the Barren Grounds south of Eskimo Point. Eifrig (1905) and Low (1906) do not mention the species. Mathiassen did not see it in 1922. Mr. Ford remembered having seen it a few times at Coats Island. Soper (1928, p. 96) did not see it on Baffin Island. Mr. Swaffield did not take a specimen on Mansel Island. As noted above, we found it common at Chesterfield, and counted as many as twenty-seven individuals on August 21 (Sutton, 1931c, p. 158).

Family STERCORARIIDÆ.

Genus STERCORARIUS Brisson.

37. *Stercorarius pomarinus* (Temminck). POMARINE JAEGER.

Eskimo Name: All jaegers are called *Ishoonguk* by the Southampton Eskimos. This name is, however, applied most commonly to the abundant Parasitic Jaeger, and the present species is frequently called the *Komigalik*, meaning 'he carries a boot.' The appropriateness of this name is evident to anyone who has seen the Pomarine in flight, when the broad and twisted central rectrices have a peculiar, heavy appearance. Soper (1928, p. 80) gives only

Ishungak as the name in use in Baffin Island. Mr. Brandt tells me that the Alaskan Eskimos called it *Can-ling-i-tal-tuck*.

Status: A rather rare and decidedly local summer resident, recorded only from Cape Low, Prairie Point, and Itiuchuk during the nesting-season; and at one or two other places during migration. It was decidedly the rarest of the jaegers save at Cape Low, where it was, at least during late summer, the commonest. It is surprising that Low (1906) and his party did not record this species at Cape Kendall, where it is probably abundant.

Fall Records: No Pomarine Jaeger was seen in the region of Coral Inlet, South Bay, Native Point, or Seahorse Point during the fall of 1929. At Hut Point, Four Rivers, and Cape Low, however, it was recorded almost daily. The first one was seen and collected at Hut Point, on August 30. The stomach of this specimen (male) was empty. On August 31 two more were seen at Hut Point.

On September 2 at Cape Low, dozens of the birds were seen and five specimens were taken. The stomachs of four of these contained only the remains of lemmings; in the fifth were the gizzard and some feathers of a Snow Bunting. At the western end of a broad, shallow lake near the mouth of the Ranger River I encountered a family group, a male and female with two fully fledged young. As I stood in the water, watching a Hudsonian Godwit, the whole family circled about me, not angry, but curious. The parent birds scolded a little, and evidently objected to the interest the young birds were taking in me, but they were never vicious enough to dive at me. Their call-note was a low, hawk-like *kek* which was succinct and matter-of-fact. The young gave a bellowing *ku-ree-ough*, *ku-ree-ough*, or *ker-ew-ah*, *ker-ew-ah*, which made the tundra ring. Once or twice the old birds gave themselves over to fits of loud, laughing cries, which had an exceedingly eerie effect. The birds were elegant in their poised flight; but there was something sinister about their quiet dignity.

The Arctic Terns pursued the Pomarines at every opportunity, but paid little attention to the smaller jaegers. A tern dived repeatedly at the dead body of a Pomarine, which I shot on September 2. On September 3 many terns were observed chasing the big *Ishoonguk*.

On September 8 one Pomarine Jaeger was noted late in the evening at Four Rivers. I think this bird was a migrant, or that it was ranging widely for food, for we had not noted the species there on our visit during the preceding week, even though I had kept a constant lookout for it every day.

I did not note any indication of post-nuptial moult in the specimens taken. The immature birds at Cape Low appeared to be in complete first winter-plumage. I did not observe any indications of premigratory flocking, though several times at Cape Low as many as seven or eight birds were seen flying about the tundra at the same time.

Spring Records: On June 9, as we were travelling by dog-team and *komatik* along the snowbanks, which bordered the gravel highlands back of Prairie Point, a great, dark-plumaged Pomarine Jaeger swung low toward us, giving us an excellent view of its mottled underparts. On June 13 several were seen in the Itiжуak region by Jack Ford and Santiana, who told me they had never before seen this species so common in the region of Coral Inlet. On June 16 one was seen about four miles east of the Post.

On June 18 I collected two males at Itiuchuk, both of which had been feeding upon lemmings. Here about three pairs were seen. They flew about the small partly ice-covered lakes. One bird alighted on the ice. It stood in rather an awkward attitude, with breast sticking out roundly in front, tail *up*, and head high.

On June 19 I observed four pairs in the region of Itiuchuk, collected a very fat male, and found a nest. The single egg, which was perfectly fresh, probably was not a complete

set. The nest, which was a broad platform of long, slender grasses, slightly cupped, was situated on a little rise of ground between two small marshy streams which ran into a grass-margined pond fifteen feet away. The pond was about three miles inland from salt-water. The parent birds led me to the nest by their constant outcry. They dived about me a good deal, but not with the noisiness of the Long-tailed Jaegers, nor with the force, dash, and boldness of the Parasitic Jaegers. They did not once attempt to strike me. The male appeared to be more pugnacious than the female. Their call-notes were, for the most part, a low, dignified *hek, hek*, which was given without much opening of the bill. A pair of Parasitic Jaegers came by, while I was photographing this nest, and the Pomarines, with an unusual exhibition of vim, gave immediate chase and drove the intruders away.

On June 21 I saw a pair at Prairie Point. On June 22 I shot a female in peculiarly spotted plumage. The central rectrices were much shortened. An egg in the ovaries was about the size of a hickory-nut. On July 17 one was seen at Prairie Point. On August 1 a dark-plumaged bird (probably young) with square, *not elongated*, tail, was seen near the Post. On August 4 one was seen near the Tern Islands.

I found but one nest while I was at Southampton Island, and since I collected that, fearing I should not be able to visit it again, I can offer no data upon the period of incubation, nor upon the care of the downy young. I did not witness any courtship antics.

Annual Routine: The Pomarine Jaeger returns from the South at about the same time as the other jaegers. Most of the birds are probably mated by the time they arrive at their breeding-grounds. The nest is usually situated in a grassy meadow. Both sexes guard and feed the young. They feed principally upon lemmings, when these small rodents are abundant; but they also capture some small birds, and occasionally rob the Arctic Terns and Sabine's Gulls of the fish they have caught. No pronounced post-nuptial moult occurs among the adults while they are on the Island, and no notable premigratory flocking takes place. The birds keep together in family-groups until the very end of the summer and doubtless undertake the migration more or less together.

Fleshy Parts: The eyes of the Pomarine Jaeger are dark brown, almost black. The feet are dull black, occasionally with blotches or spots of dull blue-gray on the front of the tarsus just above the toes. The bill is dull grayish-black, paler on the lower mandible, especially at the base which is sometimes purplish or bluish gray in color. The eyelids are dull gray. The lining of the mouth is dull yellowish flesh-color.

Other Records: Richardson (1825, p. 361) recorded this species at Igloolik, Melville Peninsula, to the north of Southampton. Rae apparently did not take a specimen at Repulse Bay in 1846. Kumlien (1879, p. 80) found it "common" on the west shore of Davis Strait, on Baffin Island. Preble (1902, p. 38) found it "common August 3 to 8" south of Cape Eskimo.

Neither Eifrig (1905) nor Low (1906) mentions the species. Bent (1921, p. 13) does not include Southampton Island in the nesting-range, but does mention "Melville Peninsula (Winter Harbor) and the Arctic Coast of North America." Mr. Frank C. Hennessey, who accompanied the A. P. Low expeditions to the regions north of Hudson Bay, recorded it at Winter Harbor (see above) where "the first of this variety was seen to arrive in the spring . . . on May 29th."

Mathiassen did not encounter the species on Southampton in 1922. Mr. Ford remembered seeing it at Coats Island where he thought it nested. Soper (1928, p. 80) did not see it personally on Baffin Island. Mr. Swaffield did not take it at Mansel Island in 1929 or 1930, and we did not record it along the west coast of Hudson Bay in the fall of 1930 (Sutton, 1931c).

38. *Stercorarius parasiticus* (Linnæus). PARASITIC JAEGER.

Eskimo Name: The word *Ishoonguk* was used among the Aivilikmiut to refer to all the jaegers, and in particular to this species. According to Hantzsch (1928, p. 93) this word (or *Issunguk*, as he spells it) means "the dull one, on account of the gray-brown coloring." Soper (1928, p. 81) spells this same word *Ishungak*.

Status: The Parasitic Jaeger is a widely distributed summer resident on Southampton, less common in the rocky eastern part than in the flat country to the west of South Bay. At Coral Inlet it is considerably less common than the Long-tailed Jaeger. At Prairie Point, however, it is the commonest of the jaegers. At Cape Low, the Parasitic and Pomarine Jaegers are commoner than the Long-tailed Jaegers, and the Pomarine is the commonest of the three. The Parasitic Jaeger arrives from the south at about the same time as the other jaegers, and departs with them in the fall. Most individuals found on Southampton are of the normal light phase, though individuals with tendencies to melanism were occasionally noted.

Fall Records: On August 18, 1929, I saw three adult Parasitic Jaegers, two near the Post, and one at an inland lake. I noted particularly the white quills and basal areas of the primaries. A few were noted daily from August 19 to 24, but they were observed to be less common than the Long-tailed Jaegers in the region of the Post. However, on August 25 we found the Parasitic Jaeger much commoner than the Long-tailed Jaeger at Prairie Point, and observed in all about twelve pairs, all with well developed young, many of which were able to fly perfectly. All the adults noted were in the usual light phase of plumage.

I paid especial attention to a pair, which had two young, near one of the grass-margined coastal lakes. When I drew near the lake the parent birds glided overhead gracefully, without making a sound. When I approached the spot where the young were standing, however, they set up a loud, hawk-like outcry, and flew near me again and again, though they did not actually offer to give battle. Finally when I flushed the young birds from the moss, the parents trailed near me, alighted, one in the grass, the other in the water, and then waved their wings in the air while crying pitifully. This demonstration was not intended, perhaps, to be a good imitation of a crippled bird; but it certainly served to direct my attention toward the parents and away from the young, which stood, stolidly enough, on the open tundra at a safe distance. Again and again I noted this behavior. They did not drag themselves along the ground, limping, or fluttering one wing as if it had been broken, but stood low on the ground, lifted their wings "spread-eagle fashion," and fanned the air deliberately, while emitting peevish whines. The young birds appeared to be much darker than their parents.

The Arctic Terns at Prairie Point constantly besieged the Parasitic Jaegers, but on August 25 I did not once see a jaeger chasing a tern.

On August 27 at Four Rivers several Parasitic Jaegers were noted. I watched a pair kill a Lapland Longspur, which they tore into pieces and swallowed unceremoniously. In capturing this bird they forced it higher and higher into the air, preventing it from seeking any cover on the ground. One jaeger finally bit it in mid-air, pulling out most of the tail feathers. Thereafter the killing of the victim was easy, since it could not properly direct its flight.

At Hut Point, where the species was common from August 29 to September 1, I noted the birds *hovering* over the ground like Sparrow Hawks (*Falco sparverius* Linnæus) watching for their prey. On August 30 I secured a large female, one of a pair, which beat back and forth near our camp, and continued to so disturb the flocks of shore-birds, that I could

not do any thorough collecting among them. This bird was very fat. In the stomach were the remains of a lemming. On September 1 a male was collected. It was rather thin and had nothing in its stomach. Whenever a jaeger came along the beach, the flocks of shore-birds surged upward to meet it, milling about it noisily, passing now to one side, now to the other, then again whirling all about it. When a solitary jaeger was thus surrounded, it seemed to pay little attention to the birds; but when two or three were hunting together they sometimes succeeded in cutting one shore-bird apart from its comrades, and then the chase to the death began.

At Cape Low many Parasitic Jaegers were seen. On September 2 two pairs were observed, one of which chased down and killed before my eyes a fully-fledged, but somewhat undersized, Black-bellied Plover. I ran up and shot one of the jaegers, as it rose from the feast; but the plover was quite dead, and much of its breast had already been torn away, though the body was warm and the blood still oozing from the severed blood-vessels. The remaining jaeger dived down, as if intent upon retrieving the plover, even after I had picked it up.

I saw jaegers also chasing young Golden Plovers; but their usual prey was the smaller shore-birds; Semipalmated and White-rumped Sandpipers; and Red Phalaropes. In hunting they frequently flew low along the edge of the tundra, just back from the gentle ridge which marked the upper limit of the beach. Unannounced, they would plunge down among the flocks of feeding birds and would sometimes succeed in pinning one to the ground before it could get away. As a rule, of course, a longer chase was necessary, in which two, three, or more jaegers took part, coursing back and forth over the tundra in a savage game of tag, in which the small bird had little chance of escape.

On September 3 I secured a female and two fully fledged young, which were excessively fat. In the stomachs of all three were the remains of Lapland Longspurs. The young jaegers stood on the ground waiting for food, but made no outcry. They both flew perfectly well. When the male observed that his mate and young had fallen to my gun, he flew off quite unconcernedly to join four other jaegers in chasing a shore-bird. In the stomach of one of the young birds were the remains of two Lapland Longspurs. On September 5 I saw about forty Parasitic Jaegers, and collected an adult and a young; the latter bird was very fat, and its stomach contained the remains of a Lapland Longspur. On September 6 I saw a pair chasing a White-rumped Sandpiper. The small bird finally made its way to a pile of stones, and with an adroit movement succeeded in hiding from its pursuers. The jaegers circled for a time, then perched on and walked about the cairn looking under and between the stones. I think they would not have given up the chase easily. When I came up they of course flew away. I finally found the sandpiper, quite unhurt, crouching in the burrow of a lemming.

On September 7 I collected two adult females, one of which was fat, the other rather thin. The former bird had a headless, but otherwise entire Red Phalarope in its stomach. This victim had been swallowed evidently without any plucking whatsoever, the primaries and rectrices all being present. It is likely that the Parasitic Jaeger casts up pellets of indigestible material such as bones and feathers, though I did not find any such pellets. The stomach of the other bird held the remains of a horned lark. On this date I watched seven Parasitic Jaegers chasing one White-rumped Sandpiper. On many occasions I saw three or four chasing one small bird. When several jaegers thus join in capturing one bird I do not know how they divide the spoils. I never saw them fighting over a victim.

On September 11 I noted two adults and an immature bird at Seal Point, and shot an adult male, which was very fat. In its crop were eight small, pointed-headed fish, which

Mr. Ford called *lances*.²⁷ The stomach also was full of the remains of these fish, which had not been stolen from the terns, for I saw the jaeger catching them in the shallow pools on the tidal flats. On September 12 four Parasitic Jaegers were seen and an adult and immature female were collected. The young bird flew perfectly well, but the parent attempted to lure me away nevertheless, flopping about in the grass, crying out hoarsely, and circling above me shouting *error, error* in harsh, strident tones.

During mid-September the following occurrences of the species were noted: one on September 13 at Coral Inlet; three on September 16 near the Post; one on September 17 at Prairie Point; two pairs on September 19 at sea between Native Point and Leyson Point; and a pair at the mouth of the Anderson River on September 20 and 21. None was seen at Seahorse Point. Our latest fall record for 1929 was September 21.

I noted during the season no sign of pre-migratory flocking of any sort. Until the last the adults and young appeared to be together much of the time. Nor did I observe any evidence of a post-nuptial or post-juvenal moult. I think the birds must undergo this moult while they are on their way southward.

Spring Records: The first Parasitic Jaeger of the spring of 1930 was a solitary individual, seen on June 11, just three days after the first Long-tailed Jaeger arrived. Another was noted on June 13 not far from the Post. On June 15 one was seen flying slowly not far from the ground, carrying a full-grown lemming in its bill. On June 16 two birds, which appeared not to be mated, were seen. On June 17 a pair were seen and the male collected. The gonads were considerably enlarged. The stomach contained remains of two lemmings. I did not note any courtship activities, and am inclined to think that, like the Long-tailed Jaeger, most of them are mated when they arrive.

On June 18 another male, the stomach containing the remains of a lemming, was collected at Itiuachuk. On June 19, while I was searching for the nest of a Pomarine Jaeger, two Parasitic Jaegers came by, and there was a fierce battle. The Pomarines eventually chased the smaller though more agile birds out of their territory. On June 20 I shot a male at Prairie Point and saw at least four pairs during the day.

On June 21 I found two nests about four miles inland at Prairie Point. Each held two eggs, almost fresh. The nests, which were rather more carefully made than those of the Long-tailed Jaeger, were not easy to find, first because they were not placed in an elevated position toward which one would naturally go in searching for such a nest; and second, because they were placed absolutely in the open without any hint of shelter from grass, bush, or stone.

The birds were clever in keeping the location of their nest from me. When I came into the nesting-territory, one of the birds invariably flew toward me, attracting my attention with its loud cries, or with its wing-flapping antics in the grass. No sooner would I pay some attention to this bird, than the other would leave the nest and come straight at me. I am convinced that the eyesight of these birds is so good that they could tell at a distance when I had turned by face so as not to be able to see the bird, as it was leaving the nest; and that the moment my eyes were turned aside the bird promptly left. I learned eventually, of course, that by retiring a hundred yards or so and watching I would see one or the other of the birds go directly back to the eggs. The Parasitic Jaegers which I saw sitting on their nests did not hold their heads *high*, as did the Long-tailed Jaegers. The eggs usually lay about an inch apart in the nests. The nests were situated on the flat prairie between the small lakes, but rarely at the water's edge.

On June 23 I saw a pair diving at a Little Brown Crane which was walking along the

²⁷No doubt one of the sand launces, perhaps *Ammodytes dubius* Reinhardt.

shore of a small lake. The crane may have been walking near the jaeger's nest, or it may even have eaten the eggs.

On June 27 Noah brought in two nearly fresh eggs from the region of Koodlootok River. On June 29 I found a nest with two eggs at Seal Point, and on July 7 a nest with two eggs, near the mouth of the Koodlootok River. This last nest was prettily situated on a gravel-ridge in a patch of pale purplish-pink flowers (probably *Arctostaphylos*).

On July 17 I watched a pair at Prairie Point, which I think had young birds, but I did not find them. On July 19 at the mouth of the Koodlootok River I spent two hours searching for the downy young, which I knew had hatched at the nest discovered on July 7. I watched the old birds carefully and saw them go to a certain spot, where they appeared to brood, but by the time I got to this spot nothing was to be seen there. Either the young ran very nimbly (which I think was not the case) or the old birds were deliberately trying to give a wrong idea as to their whereabouts. The parent birds dived at me savagely, barely missing my head as they swooped, the roar of their stiffly set wings sounding in my ears most uncomfortably. Tired of diving at me, they finally fell into the grass, waddled about, waving their wings and crying in a hoarse voice. In the most anguished of their demonstrations they fell into the water, where they moaned and croaked as they whirled about, flapped their wings, and dragged along, with their tails sometimes pressed downward into the water. The customary call-notes these birds gave were a low *kek* or *kep*, which they varied with occasional outbursts of a sharp, ringing *err-ur, err-ur*. I saw one of these jaegers catch a fledgling Lapland Longspur simply by dropping upon it in the grass.

On June 21 two were seen at Seal Point trying to capture baby Old-squaws, which were swimming about with their mothers in the middle of a small lake.

On July 30 I collected a male and two females at Seal Point. All were rather fat. The stomach of the male contained remains of a Lapland Longspur. The stomach of one female contained a juvenal Lapland Longspur, the feet of a downy young Red Phalarope, and remains of a fully developed Semipalmated Sandpiper. The stomach of the other female contained the remains of a young horned lark. No mouse fur or bones were found in any of these stomachs.

A few were seen daily about South Bay from August 1 to 16. I did not, while on Southampton, succeed in finding a downy young.

Annual Routine: No jaeger spends the winter in this latitude. The Parasitic Jaeger returns from the south late in May or early in June at about the time the other species appear. By the time it reaches its nesting-ground the pairs are usually mated. When the birds first arrive, they live upon mice to a considerable extent, until small birds become abundant.

The nest is situated in the open, usually in a grassy meadow in the coastal lake country, or on a low gravel-ridge. It is rather neatly lined with dry grass, or bits of lichen. The eggs, which almost invariably number two, lie about an inch apart in the nest. While eggs are in the nest the parent birds are noisy, but scarcely vicious toward intruders; but after the young have hatched they fight savagely.

As to the period of incubation I gathered no definite data. Fresh eggs were found in three places on or about June 21, and downy young, probably just hatched, were known to be near their nests on July 17, so the eggs are probably incubated about 25 or 26 days. The period of incubation likely does not differ greatly from that of the Long-tailed Jaeger, which is said by Bent (1921, p. 23) to be twenty-three days. Both sexes incubate, and both are equally solicitous for the safety of the eggs and young.

In the late summer, family-groups go about together, the parents capturing food for their fully fledged offspring, which can fly perfectly, but which have not learned to catch their own prey. No premigratory flocks are formed; and, so far as I observed, no definite post-nuptial or post-juvenal moult is undergone, while the birds are on the Island.

I did not see a single well defined example of the dark phase of plumage, though one bird was collected, which had dark markings on some of the feathers of the breast. I saw a few adult individuals the plumage of which showed traces of immaturity, particularly on the under tail-coverts. All specimens collected were in decidedly good plumage, the primaries and rectrices always being in good condition.

Aside from the occasional gull or fox, which may take its eggs, and the Eskimos, who sometimes rob the nest, the Parasitic Jaeger has no natural enemies on Southampton Island. On the other hand, it is probably the worst enemy of the small bird-life of the entire region. I never actually saw it steal eggs from nests, but I have no doubt it does upon occasion. It pursues and kills nearly all kinds of small birds from Hoary Redpolls to Golden and Black-bellied Plovers, especially during the middle of the summer. I did not make certain how many small birds one jaeger customarily kills and eats in a day, but I should not be surprised to learn that from four to eight or ten are captured. It is a far worse menace to the small bird-life than either the Long-tailed or the Pomarine Jaeger, and it pays little or no attention to mice, when small birds are available.

The structure and habits of the jaegers in general are extremely interesting in that they so closely approximate those of a widely different group of birds, the birds of prey. The beak is strong and hooked; the wings are strong, long, and pointed, almost as in a falcon; the tail is long and adapted for swift, erratic flight; even the claws are somewhat hooked, though I confess I never saw a jaeger of any sort carrying prey about in its "talons" as Turner (1886) is said to have observed it in Alaska. Many of the call-notes are distinctly hawk-like; the eyes have the expression of a hawk, set as they are under a brow, which gives them a fierce glare. But even more interesting than any of these adaptations is the difference in the size of the sexes. As in raptorial birds, the female jaeger is larger and heavier than the male.

Fleshy Parts: I have never seen a downy young Parasitic Jaeger. Young birds well able to fly have dull gray bill and flesh-colored mouth-lining. The tarsi are dull blue-gray, and the toes and their webs blackish. In the adults the bill is almost black, the lining of the mouth dull yellow, the tarsi dull blue-gray to blackish, sometimes with a blotched appearance, and the toes and webs blackish. The eyes are always very dark brown.

Other Records: Lyon (1825, p. 47) mentions *Larus parasiticus* in his account. Parry (1828, Appendix) records "the Arctic Gull or Boatswain, (*Larus Parasiticus*)" from the region of Duke of York Bay. Rae apparently did not take it at Repulse Bay. Kumlien (1879, p. 95) found it rare about Cumberland Sound, Baffin Island. Preble (1902, p. 78) found it "common on the Barren Grounds below Cape Eskimo, August 4 to 13." Eifrig (1905, p. 235) says: "Two skins were brought from Cape Fullerton, where the birds were not common. The Arctic Tern (*Sterna paradisaea*) suffers most from its depredations. Two eggs were collected in Southampton Island. . . The stomach contents of this and the next [Long-tailed] species were bones and feathers which seem to indicate that they may occasionally act as true birds of prey. This species was more common than the next."

Low (1906, p. 315) says: "Common about Roe's Welcome, where it preys upon the Arctic Tern; less common farther north. Eggs from Southampton. Nests on islands in ponds. Skins from Roe's Welcome." Bent (1921, p. 19) includes "northern Hudson Bay

(Southampton Island)" in the breeding range. Mathiassen did not record it from the region of Duke of York Bay in 1922. Mr. Ford found it common on Coats Island during his residence there. Soper (1928, p. 81) apparently found it rather rare on Baffin Island. Mr. Swaffield collected a specimen on Mansel Island on September 30, 1930 (Sutton, 1932a, p. 42). We recorded it at Chesterfield during the fall of 1930, but not southward of that point (Sutton, 1931c, p. 158).

39. *Stercorarius longicaudus* Vieillot. LONG-TAILED JAEGER.

(Plate XV, figs. 1-4; Plate XXII, figs. 7, 8)

Eskimo Name: Usually *Ishoonguk*, as the other jaegers. Rarely it was called *Pumyoolik*, meaning 'it has a tail.' Mr. Brandt tells me that the Alaskan Eskimos called it *Chah-wa-sho-yuk* (etymology unknown to me).

Status: A widely distributed summer resident, somewhat less common in the rocky eastern part than in the flat prairies west of South Bay. It may nest several miles inland, but with many other species appears to prefer the coastal lake-belt. It is not so common on the whole, as the Parasitic Jaeger, but it is much commoner than the Pomarine, save at Cape Low. It is by far the commonest species in the vicinity of the Post, but is less common than the Parasitic Jaeger at Prairie Point.

Fall Records: While the *Nascope* was being unloaded on August 17, 1929, two handsome Long-tailed Jaegers circled about us again and again, fluttering their wings rapidly and gracefully as they alighted on the water with the Herring Gulls, picking up scraps. One bird snatched, but did not eat an apple-core, which I threw to it. The quivering tail-feathers lent a charm to their poised, hawk-like flight.

I found the Long-tailed Jaeger decidedly the commonest species of the genus about the Post, and saw from one to four individuals nearly every day through the late summer. A pair regularly came to the little cove near the Post to feed. Here they walked about in the mud, perched on the rocks, or coursed back and forth above the shallow water apparently seeking some sort of fish. They thus spent about an hour each day during the latter half of August.

On August 19 I encountered a pair and their two fully fledged young, which were barely able to fly, about five miles east of the Post. These birds all frequented a rocky knoll near a lake, where on a low islet a colony of Arctic Terns lived; but I could not see that the jaegers paid the slightest attention to the terns. I doubt if I should have found these birds at all had I not heard the loud, peculiarly vibrant call of the young, as they begged for food. I thought, upon hearing this call for the first time, that it was the cry of distress of an Arctic Hare or some other medium-sized mammal, and ran up quickly only to startle an ungainly bird, which lifted its wings awkwardly, leaped into the air, and flopped a rod or so up the knoll. It stood perfectly still upon alighting, eyeing me without alarm. Then it leaned far over, opened its mouth toward the ground, and began bellowing. As I approached, it walked away a short distance, then flew about me erratically. It acted as if it felt it should be alarmed under these circumstances, but did not know what to do. Presently it was joined by another awkward noisy young bird, which stood for a moment near it, then sank on its belly.

When the parents appeared, I knew these peculiar young birds were Long-tailed Jaegers. They renewed their squawking and bellowing and ran blunderingly through the rocks toward the old birds, which, agitated at my presence, perched on nearby boulders, cackling loudly. They circled about me, too, but did not dive at my head. In perching their tails

stuck upward more than usual, and their round creamy-white breasts gleamed against the gray-brown background of the tundra. Their attitude in standing was not especially graceful, since the forepart of their body seemed a trifle heavy for the slender tail. The parents regurgitated some food upon the ground. This the young birds picked up and ate ravenously.

The flight of the young birds was exceedingly awkward, though it was rather swift. As they flopped up and off, they seemed to have little idea as to where they were going and plunged this way and that, up and down, as if they had been partially stunned. I collected the adults and one of the young. In the stomachs and gullets of all were the remains of lemmings and of some small slender fish. Neither of the parents was fat; but the young one was exceedingly fat. Traces of the natal down clung to the feathers of the young bird.

On August 20 a single bird was seen perched on a great boulder about seven miles inland from the Post. This bird came straight at me, dived at me once, circled twice, and flew off. On August 21 I noted a pair and wrote down the call-note as a rapidly repeated "*li-kaow*."

On August 27 at Four Rivers I collected a pair and one of two young, all of which frequented a low gravel-ridge about a mile inland. As I approached this ridge both adult jaegers came toward me rapidly, flying near the ground. They made considerable outcry. The young bird was exceedingly fat. The stomach of all three birds contained remains of lemmings, one of which had been swallowed whole.

On August 29 one was seen at Hut Point. As we moved westward I noted that this species became steadily rarer, while the Parasitic and Pomarine Jaegers became noticeably commoner. On August 31 at Hut Point I shot two male birds, both in full breeding plumage. They dived at me, as if there were nests in the vicinity. Both had been incubating eggs, judging from the bare areas in their belly-plumage. Their call-notes I wrote down as "*cree-oo, cree-oo*," or "*klee-oo, klee-oo*," repeated in a spirited, cackling voice, the *r* and the *l* being rolled harshly. We ate these jaegers and found them very well flavored.

The species was noted in the late fall as follows: one at Ranger River on September 2; one at Four Rivers on September 3; one at the Post on September 12; and one at Native Point on September 19.

During the entire fall I did not see a Long-tailed Jaeger chase an Arctic Tern or Sabine's Gull; nor did I see one attempt to capture any sort of smaller bird. Stomachs examined contained only remains of mice and small fish. I found no trace of any vegetable food in any of the stomachs, save that which the lemmings had swallowed.

Several times I found feathers (once a central rectrix) on the tundra indicative of a post-nuptial moult; but the specimens taken without exception were in excellent plumage. I did not note any tendency toward pre-migratory flocking, nor did I at any time note any considerable variation in plumage from the usual so-called "light, or normal phase." The young birds I observed appeared also to be of but one phase.

Spring Records: According to my notes the Long-tailed Jaeger returns earlier than the other two species. A pair were noted at the head of South Bay on June 8, 1930, flying toward the south. The first Parasitic Jaegers were not seen until June 11.

On June 9 several flocks of three, four, five, and nine individuals were noted flying high over the snow-covered tundra at Prairie Point. Two females (fat; gonads enlarged; stomachs empty) were collected. Sabine's Gulls also were noted on this date, but the jaegers paid no attention to them. I did not witness any courtship antics, though the birds chased each other occasionally, as if in play.

On June 10 all the birds I saw appeared to be mated. I watched a pair at the head of South Bay for some time. One of the birds swam about in the shallow water, which had

melted on the ice of a small lake. Finally it stood in the water and bathed deliberately. Then it walked out to an exposed point on a flat boulder, sank on its belly, opened its wings, and took a sun-bath.

On June 11 I observed two mated pairs back of the Post. These birds evidently had chosen their nesting-ground, for they remained all day in the same place, save when they flew down to the coast to seek food along the shore. They spent much of their time *lying* on prominent knobs or ridges. So peaceful were they, that often I walked quite close to them before they rose to their feet. I shot the male of both these pairs. Both specimens were fat. The stomachs of both only contained remains of lemmings. The smaller male birds were noticeably less wary than the females.

On June 16 I collected a male and female (a mated pair, I think) in the region where I had observed two pairs on June 11. I noticed that there was a good deal of noisy pursuit going on among the birds here. Male birds were chasing the larger females with much screaming and a considerable display of speed and grace in flight. High, long-drawn-out notes were given, and cackling cries sharply repeated, *krik, krik, krik*. I think the females, the mates of which I had shot on June 11, were selecting new mates. The considerable demonstration among these mating birds led me to believe that most of the Long-tailed Jaegers are mated, as a rule, by the time they return to Southampton in the spring. Certainly prior to the killing of the males of the two mated pairs back of the Post there had been no noticeable courtship displays, or contests of this sort.

On June 18 I found a mated pair at Itiuachuk. The female was more pugnacious than the male. On June 19 I found a nest containing one egg on a low gravel-ridge. The nest was a mere depression in the turf, scantily lined with bits of green lichen. I searched nearly an hour for this nest, for I did not at the time realize that by retiring to a respectful distance, I would induce the incubating bird to return promptly to the nest. The female bird fought nearly all the time, diving at me again and again, but never striking me. As she flew about, the long tail-feathers quivered and vibrated constantly, and I noticed that they were *always separated*.

On June 22 in an upland marsh near Itiuachuk I located a nesting pair near an inland colony of Arctic Terns; and I even saw one of the birds sitting, head held high; but since I was a long way from camp, I did not attempt to collect the eggs.

On June 24 I found and collected a set of two eggs not far from the Post. The nest was discovered easily. After seeing the birds, I stationed myself on the crest of a rocky knoll among the boulders, and watched them with my glasses. The male flew almost directly to the nest, stood above it for an instant, scanning his surroundings, then settled quickly on the eggs. He did not turn them with his bill, and did not seem to wriggle his body from side to side, as he nestled down. As he incubated he sat with head held high. His breast gleamed brightly at a considerable distance. The eggs lay about an inch apart in a shallow depression in the moss. They were almost fresh. The male of this pair fought more fiercely than the female.

On July 3 I collected a pair and their heavily incubated eggs not far from Poorhouse Hill. These birds were very demonstrative, but they never actually struck me. I hit the female once with a stone. I made several photographs of the attacking birds, one of which proved to be fair. The stomach of the female was empty; that of the male contained only the remains of some large crane-flies. The nest was a rather deep cup in the gravel, lined with bits of lichen. The eggs lay about half an inch apart.

On July 5 Noah took a set of two eggs for food. On July 7 I found an exceedingly hand-

some, pale-green set (two) near the Koodlootok River. In this case the site of the nest was the crest of one of the long gravel-ridges about two miles inland.

On July 14 about seven miles east of the Post I collected a newly hatched downy young. Though this little bird apparently could not even walk (at least it did not try to), it was not at its nest; nor could I find another young bird or an egg anywhere about. It simply lay on the gravel without making a sound or movement of any sort. When I picked it up, it scarcely even kicked and did not peep. The parents dived at me incessantly for half an hour; but they left me promptly when an Arctic Fox came by, and chased this hated enemy until he was a mile away. The stomach of the young bird contained what appeared to be the remains of a downy young Semipalmated Sandpiper. This is the only evidence I found that the Long-tailed Jaeger ever captures birds at Southampton.

On July 27, in a region where I had never before noted any jaegers, I found a nest containing two eggs, which were, I think, a second set for the season, and which were very dissimilar in appearance, one being heavily spotted, the other almost immaculate. I approached the incubating female to within thirty feet before she rose. Both parents fought me violently, calling *cri-crak*, *cri-crak*,²⁸ until I thought their voices would give out. In the middle of their tirade against me, a Herring Gull appeared and they darted off after this new antagonist, changing their call-notes entirely to a high *coo-lee-oo*, *coo-lee-oo*.

These jaegers fought me most of the time, while I was at the nest. Occasionally, however, one of the birds would descend to the ground to flop about, as if badly crippled, waving its wings frantically, laying its head on the ground or to one side, squealing pitifully in a thin voice. If I paid any attention to such a bird, the mate often dropped from the air and joined in the exhibition, sometimes coming close, and waddling along with handsome tail widely spread and turned to one side.

On July 28 I noted the call-notes of an attacking female as *coo-ree-ar*, *coo-ree-ar*.

I witnessed on August 1 an extravagant display of antics suggesting injury. I had discovered a fully fledged young bird, which was not yet quite able to fly. The parents flew about and at me, sometimes only four or five feet above my head. They fell at my feet, waddled about, lay on the gravel, panting, squealing, and kicking, or ran along with their breasts on the ground, pushing themselves frantically forward. One bird deliberately fell into a nearby pool and splashed about until I ran toward it. The other bird walked toward me, lay on its side and screamed. Finally it disgorged some partly digested food, apparently the remains of lemmings, at which it looked, and then re-swallowed. I photographed the young bird several times and took it to the Post, where I painted its portrait from life. The parent birds escorted me fully half-a-mile.

Annual Routine: The Long-tailed Jaeger returns from the south a short time before the lakes thaw. It arrives in small flocks. The sexes arrive simultaneously and many of the birds probably are mated by the time they reach their nesting-grounds. During the early spring they live exclusively upon lemmings.

As soon as the snow melts, the nesting-site is selected, and the handsome eggs are laid. The set usually numbers two. I am not sure that the eggs are laid on consecutive days. Both sexes incubate and fight with great fervor, if the nest is disturbed. Bent (1921, p. 23) says that the period of incubation is twenty-three days. But one brood is reared during a season; but if the first set of eggs is destroyed, a second is generally deposited in a new nest without much delay. The young hatch in mid-July. They grow up near their nest.

In late summer the post-nuptial moult begins; but this moult is undertaken so deliberately

²⁸The *r* harshly rolled, giving a very rough, grating sound.

that the birds never have a bedraggled appearance. They go about in family-groups until they depart for the south. No large flocks are formed at this season.

The principal enemies of the Long-tailed Jaeger are the Arctic Fox and the Herring Gull. Other species of jaegers may occasionally steal their eggs. The Eskimos as a rule do not disturb them.

Fleshy Parts: In a sketch of a downy young made on July 14, the eye is black; the bill is dull blue-gray, with the egg-tooth whitish and an area of pinkish flesh-color at the base of the lower mandible; the legs are *pale Payne's gray*,* save along the front of the tarsus and at the heel, where they are pale *Chatenay pink*; and the feet are *pale pinkish buff*, save at the joints, which are pale gray almost of the same shade as the tarsus.

In a sketch of a considerably older, almost fully fledged bird (August 1) the eye is dark brown; the eyelids dull gray; the bill blue-gray, darkest at the tip, and purplish flesh-color at the angle of the mouth and along the upper part of the base of the lower mandible; the lining of the mouth is dull purplish flesh-color, and the tongue almost *salmon-color*; the legs are *pale medici-blue*, and the feet pale flesh-color, brightest on the sole and hallux, darkest toward the tips of the toes and somewhat grayish along the sides of the toes.

Among the young birds examined during the fall of 1929 there were some individuals in which the black extended farther up into the blue-gray of the tarsus, farther on one leg than on the other: a curious case of bilateral asymmetry.

In the adult the eye is brown, very dark; the bill gray, darkest at the tip; the tarsus blue-gray, and the feet blackish; the lining of the mouth dull yellowish.

Other Records: Parry (1828, p. 35) tells us that a "Boatswain" was seen on August 12 at the eastern end of Duke of York Bay. This bird may have been of the present species. Kumlien (1879, p. 95) saw a few about Cumberland Sound, Baffin Island. Preble (1902, p. 79) states that a specimen from Duke of York Bay is recorded in the British Museum Catalogue of Birds. Eifrig (1905, p. 235) says: "Three specimens in the light phase of plumage, were collected at Fullerton. . ." Low (1906, p. 315) says: "Less common than the former species [Parasitic Jaeger] in Roe's Welcome, and seen occasionally in the waters to the northward. Skins from Fullerton and Southampton; eggs from Southampton. . ." Bent (1921, p. 28) includes in the breeding-range Southampton Island and the "west coast of Hudson Bay (probably as far south as York Factory)." Mathiassen did not see it in the fall of 1922. Mr. Ford recalls that it was a common bird at Coats Island. Soper (1928, p. 81) gives us a few records from southern Baffin Island. Mr. Swaffield did not take a specimen at Mansel Island during 1929-30. We did not record it along the west coast of Hudson Bay during the fall of 1930.

Genus CATHARACTA Brünnich.

Catharacta skua Brünnich. NORTHERN SKUA.

Preble (1902, p. 78) says concerning this species: "*Larus keeask* of Latham (Index Ornithologicus, II, p. 818, 1790), stated to inhabit Hudson Bay, and based on Hutchins's 'Esquimaux Keeask' (Latham, Synopsis, III, Part 2, p. 389, 1791), probably refers to the present species. Though it has apparently not since been recorded from Hudson Bay, the facts of its presence in Hudson Straits and its breeding at Lady Franklin Island (see Kumlien, 1879, p. 94) north of the Straits, render its occurrence on the waters of the Bay probable."

On September 22, 1929, at Seahorse Point, I saw a short-tailed, dark-colored jaeger, which appeared too large, bulky, and square-tailed for a Pomarine; but since I did not see

*All italicised words used in these descriptions are from Ridgway's *Color Standards and Nomenclature*.

it at close range, I cannot state with any degree of certainty that it was a Skua. The Eskimos told me they had seen *Ishoongayyak* (unusually large *Ishoonguk* or jaegers) once or twice in the waters east of the Island, but that they had never seen one in the region of South Bay, or at Cape Low.

Family LARIDÆ.

Subfamily LARINÆ

Genus LARUS Linnæus.

40. *Larus hyperboreus* Gunnerus. GLAUCOUS GULL.

Eskimo Name: The Aivilikmiut gave the name *Nowyah* to all gulls, in general, just as they called all sandpipers *Shidgeriak*. Large gulls they sometimes called *Nowyavik*. The present species had a special name, however, which I did not often hear, *Kaumak* or *Koumak* (etymology unknown to me).

Status: The Glaucous Gull does not nest anywhere on Southampton Island proper, so far as we have been able to determine, though its behavior at Seahorse Point suggested to me that it may occasionally nest there on the high cliffs. It is known, however, to nest at Walrus Island, in South Bay, where the Eskimos secured for me specimens of downy young in mid-summer; and at Coats Island, where Mr. Ford found it in summer at Cape Préfontaine, along with Brünnich's Murre. The birds, which nest at these two points, probably wander a good deal in late summer and fall, for they are found at this season all along the southern coast, throughout the waters of Fisher Strait and Evans Inlet. It lingers very late in the fall, and has been noted in mid-winter and early spring. The probability is that when temperatures are not too low, when the water is open so that food may be obtained, and especially when there is a whale or walrus carcass which has not been too deeply buried under snow and ice, it remains throughout the winter, along with Mandt's Guillemots and the occasional Brünnich's Murres. It is about half as common as the Herring Gull during the period of migration. It is never seen inland, as is the latter species, though it may follow the shore-line of the coves and inlets in seeking food. It was noted much more commonly in the region east of South Bay than in the vicinity of Cape Low. It was especially noticeable at Seahorse Point.

Fall Records: A sub-adult male was collected on September 1 at Hut Point. This was the first Glaucous Gull noted during my stay on the Island. It was very fat. On September 4 an immature female was taken at Four Rivers. In the stomach were the remains of some small, pale-colored sculpins and some tiny clam-shells. These two were the only individuals noted on our entire trip to Cape Low and return.

On September 19 a young male was taken at Leyson Point, and several others were seen, including one, which appeared to be fully adult, with evenly colored mantle and bright yellow bill. On the following day near the gigantic carcass of a whale, which had been killed during the summer, and which had washed ashore near Leyson Point, we saw at least two hundred Glaucous Gulls, and four young birds were collected, two males and two females. All these specimens were juvenal save one, a female, which was probably two years old. Among all the birds, which circled over and about the carcass, I did not see one which was obviously an adult, and none had a yellow bill. For the most part they were silent. A Polar Bear which fed regularly at the carcass had opened a great hole in one side of the belly and here, while the big carnivore was away, the gulls would gather and spar with each other for the choicest positions.

In the vicinity of Seahorse Point Glaucous Gulls were seen every day, and among the numerous young birds were several, which were obviously adult. On September 21 about thirty birds were seen and an immature female was collected. One adult was noted. In this bird the post-nuptial moult was at its height. On the following day several were seen at the carcass of a bear, which had recently been shot by the Eskimos. No adults were seen. On September 23 about sixty birds were seen, all of them young, save six pale-mantled, yellow-billed birds, which had a bedraggled appearance, as a result of the moult through which they were passing. Their tails were stubby, their wings frayed and irregular, and they flew a bit awkwardly.

My experiences with Glaucous Gulls on September 23 were memorable. Early that morning I had routed a Polar Bear from a mossy spot where he was eating berries and mushrooms. Without realizing I had done so I had followed the course the bear took in running away from me. While descending a cliff, over which a loose flock of gulls and ravens had been circling, I suddenly spied the bear in the water, his great, creamy white body gleaming like a green glass bottle through the clear sea-water. As I watched him, he emerged, shook himself noisily, and made his way up the rocks toward the carcass of a large Harp Seal, which he had partly eaten, and about which the gulls were hungrily flying. At every deliberate step the bear took, the gulls swung about him, dipping low toward his head and teasing him with low, insistent cries. Finally the huge brute put his foot upon the seal, sniffed at it and rolled it a little with his massive paws. For some reason, perhaps because I was nearby, he did not begin eating; and the longer he waited the more noisy and fretful the gulls became. Sometimes they almost touched him on the head and he would sniff at them, turn his head, with eyes closed, in their direction, and emit a deep growl. Once or twice he actually started to stand up the better to strike at them with his forepaws.

From September 24 to 27 Glaucous Gulls were recorded daily in the region of Seahorse and Leyson Points, and three young birds were collected: a male and female on September 26; and a female on September 27. Those taken on the former date were probably in their second year; that taken on the latter date was a young of the year, in very brown plumage. No yellow-billed birds were noted on this date.

I noted that as we progressed westward from Seahorse Point the Glaucous Gull gradually became rarer. Near Kikkuktowiyak Island a few were seen, but by the time we had reached Native Point, all the Glaucous Gulls had dropped behind our boat, leaving only the hungry Herring Gulls.

On October 10 at Seal Point and in the vicinity of the Post, a considerable flight of gulls toward the eastward took place. Most of these were Herring Gulls, but I noted at least one Glaucous Gull among them. All were flying high. The loose flocks continued to pass for two hours. On October 13 similar flocks were noted also passing eastward, and two Glaucous Gulls, one a creamy white sub-adult, and one a brown juvenile, were noted. On the following day a brownish young bird was seen at Seal Point.

Gulls believed to be Glaucous Gulls were also noted not far from the Post on October 15 and at Bear Island on October 20.

Winter Records: The natives assured me that they had frequently seen these large gulls along the open water, especially in the region of Seahorse and Leyson Points during the dead of winter. Occasionally the birds are caught in fox-traps, when their natural food becomes difficult to find, or when the open water becomes filled with rough ice.

On November 25 at Tooktootok Island, just north of East Bay, Amaulik Audlanat, Muckik, and I saw a large white bird which we all thought was a Glaucous Gull. Since

we did not have opportunity to inspect it with our glasses, however, and since it was not seen at close range, there is some question about its identity.

On December 11 not far east of the Post, and flying about three hundred yards above the frozen harbor, a large gull passed over. I think it was a Glaucous Gull, for the tips of the wings were plainly white, and it was a very large bird.

On February 15, 1930, Muckik and his party saw one, an adult according to their description, circling about the open water of the floe not far from Seahorse Point. It was feeding upon the remains of a seal, which had been killed in the vicinity by the Eskimos.

Spring Records: There is a northward movement of this species as soon as the edge of the floe begins to break up. On May 12 six Glaucous Gulls were seen at the floe near Native Point. They came very near to us, whenever we shot at the seals, as if they sensed the meaning of the sound of the guns. From May 7 to 15 when many of the natives were hunting seals and walrus at the floe, several Glaucous Gulls were observed.

On May 27 three birds were seen southeast of Bear Island. One of these was an adult. None was seen near the Post in the spring of 1930.

On July 24 Amaulik Audlanat and several other Aivilik hunters went after walrus at Walrus Island, and there found about sixty pairs of Glaucous Gulls nesting. They brought back with them four fine adults in full breeding plumage, and three fairly large young which were still covered with down. One of these had fallen down among the rocks and had broken its legs badly. The nests, as reported, were built along the ledges of the steepest side of the island. The young were still together in family-groups, usually three individuals in a group. In the stomachs were the remains of small fish.

Annual Routine: The Glaucous Gull probably does not migrate far south of Southampton Island during the winter. When it can find enough food in the open water of Evans Inlet and Fisher Strait, it doubtless remains in limited numbers, and most of the birds probably do not find it necessary to leave Hudson Bay during the entire duration of the cold season. As the ice breaks up in spring, they return northward promptly. At Walrus Island they probably sometimes remain the year round.

I have no data upon the courtship antics, nest-building, or period of incubation, since I personally did not find or observe any nests. The young are all on the wing and wandering widely by September, and none of these birds undergoes any post-juvinal moult during the early part of the fall. The adults, on the other hand, have a complete post-nuptial moult, which gives them a forlorn appearance during September. At this time they are not much in evidence; but the young are to be seen everywhere along the southeastern coast.

The Glaucous Gull has few, if any, natural enemies in this region. Nesting on the islands, as it does, foxes cannot reach the eggs or young; and the islands where it nests are so far from the Eskimo encampments that the natives do not often take its eggs. Ravens and Herring Gulls probably steal its eggs, when they have opportunity, and I found the feathers of an adult bird at Seahorse Point which may have been killed by a White Gyrfalcon.

Fleshy Parts: There was a great deal of variation in the color of the eye in this species. Half-grown young taken in the middle of the summer had dark eyes, in which the pupils were somewhat bluish and the irides deep brown. Brown-plumaged, obviously young birds, taken in the fall also had dark eyes, the brown of the iris being somewhat lighter than in birds in the nest. Somewhat older birds had pale gray and gray-brown eyes of varying agate shades, some of them light enough to be called whitish. In specimens where the plumage was mottled with the pale pearl-gray of the adult, the eyes were usually yellowish white, or very pale grayish yellow. In the full adult the eyes were always pale, clear yellow.

The color of the eyelids also varied a good deal: that of the half-grown young being dull, almost bluish, flesh-color; of juvenals taken in September, pale flesh-color; of sub-adults, flesh-color somewhat darker than in younger birds; and of adults, dull orange-yellow.

The bill of the downy young was pale flesh-color, almost whitish in some individuals, with dusky tip. In older young these colors were about the same, the base of the bill usually being a sort of dead white. In adults, the bill was clear, deep yellow, with an orange spot near the angle of the lower mandible.

The feet of young birds, taken from the ledge on which they nested, were dull brownish flesh-color, the edges of the scales being of a somewhat darker color on the front of the tarsus giving that region a slightly squamate appearance. In older birds the feet were brighter flesh-color. In adults in high plumage they were pinkish flesh-color.

Other Records: Lyon (1825, p. 47) mentions *Larus glaucus* in his interesting account. Kumlien (1879, pp. 95-96) found it the commonest breeding gull at Cumberland Sound, Baffin Island. Preble (1902, p. 79) says: "Doubtless found in all parts of Hudson Bay. It has been recorded from Melville Island, Felix Harbor, and other places in the Arctic Regions, and has been found breeding in James Bay and at various points on the east coast of Hudson Bay ([Macoun] Catalogue of Canadian Birds, Part I, p. 34, 1900)." Eifrig (1905, p. 236) mentions it from Ungava, but does not speak of its occurrence in Hudson Bay. Dr. Bishop tells me that Captain Comer sent him a set of eggs taken at "Southampton, July 5, 1904." Low (1906, p. 315) says: "The common big gull of the north. Common about Fullerton and Cape Chidley." Bent (1921, p. 60) includes "northern Hudson Bay (Fullerton)" in the breeding-range, and states that it may be found in winter "north to limits of open water." Mathiassen did not find it in 1922 at Duke of York Bay. Mr. Ford found it common at the cliffs at Cape Préfontaine, Coats Island. Dwight (1925, p. 244) gives its breeding-range as circumpolar, "largely north of the Arctic Circle . . . but in North America south to the Alaskan Peninsula, Hudson's Bay, and Labrador . . ." Soper (1928, p. 82) gives us an interesting account of the species in southern Baffin Island, where it is apparently rather common. Mr. Swaffield did not take a specimen on Mansel Island.

41. *Larus leucopterus* Vieillot. ICELAND GULL.

Eskimo Name: The Eskimos, with whom I hunted, did not know this species. The specimen I collected while with them they recognized as somewhat different from the other *Nowyah* which were seen close by, but they did not attempt to give it a special name of any sort. This I believe is fair evidence that the Iceland Gull is a rare bird on Southampton Island. Soper (1928, p. 83) gives this name precisely the same spelling.

Status: A rare and irregular migrant, perhaps best considered a wanderer or straggler. I was in no way able to verify reports that a white gull, similar to, but smaller than, the well-known *Kowmak*, or Glaucous Gull, nested at Walrus Island, and since no specimens were taken by the natives in their several trips to that island, I am inclined to think the reports were erroneous.

Records: On September 27, 1929, not far from Kikkuktowyak Island, I shot an immature male from a large flock of Herring Gulls, which were following our motor-boat. I had watched this bird at a distance for some time, and had noted that it was somewhat smaller than the Herring Gulls, that it was of a peculiar buffy, even shade of tan, and that its wings, though rather dull in appearance, were certainly not tipped with black or blackish brown. The bird was so deliberate in its movements and lagged behind the other gulls so much of

the time, that I had difficulty in getting it. Upon picking it up, I noted at once the difference in its color-tones from those of a young Herring Gull, which I had also collected; observed the slenderness and smallness of the bill, and decided that it must be a gull new to my collection. It was not fat. Its stomach contained only a few pieces of Polar Bear fat, which we had been throwing overboard. The bill was dull blackish brown; the eyes were rich, dark brown; and the feet brownish flesh-color.

A gull, which appeared to be white, and which certainly had unmarked wings, was seen at Tooktootok Island on November 25 by Amaulik Audlanat, Muckik, and myself. This bird was seen only at a distance, and it may have been either a Glaucous, an Iceland, or an Ivory Gull.

On May 15 and 27, 1930, a small white-winged gull was seen in company with several Herring Gulls (both adult and young) and Glaucous Gulls, at the floe west of Native Point. I studied this small bird with my six-power glass and felt reasonably certain that it was an Iceland Gull. The same individual may have been seen on both dates. The bird seen on both dates was in somewhat mixed plumage, the under-parts being buffy or brownish, the upper-parts somewhat grayer.

Other Records: Rae (1850, p. 52) says that on August 3, 1846, "a white-winged silvery gull (*L. leucopterus*) [was] shot" along the coast of Melville Peninsula. Kumlien (1879, p. 98) found it "far less common" in Cumberland Sound, Baffin Island, than the Glaucous Gull. Preble (1902, p. 79) says: "Undoubtedly occurs on Hudson Bay during migrations, since many winter on the Great Lakes, and Arctic Expeditions have obtained specimens in Davis Strait and Baffin Bay and at Melville Island." Neither Eifrig (1905) nor Low (1906) mentions the species. Bent (1921, p. 64) says the species is said to breed in Hudson Bay, but I have not determined the source of this information. Soper (1928, p. 83) took two specimens on Baffin Island. Mr. Swaffield did not take it on Mansel Island, nor did we see it along the west coast of Hudson Bay during the fall of 1930 (Sutton, 1931c).

Larus kumlieni Brewster. KUMLIEN'S GULL.

This bird, which is now regarded by the Committee of the American Ornithologists' Union (1931, p. 371) as a hybrid between *Larus leucopterus* and *Larus argentatus thayeri*, has never actually been taken on Southampton Island to the best of my knowledge, but it has been recorded from the general region several times.

On September 23, 1929, I saw what I am sure was a Kumlien's Gull flying about with a large flock of Herring Gulls near our motor-boat, at Seahorse Point. In trying to collect this specimen I somehow shot another bird and the bird with the gray wing-tips got away. On August 29, 1930, I saw an adult individual very clearly near Marble Island (southwest of Southampton, and not far from Chesterfield) which circled our boat and fed nearby (1931c, p. 158). I have seen the bird at Cape Wolstenholme and at Cape Dorset, Baffin Island, also.

Kumlien discovered this bird in 1878 at Cumberland Sound, Baffin Island. He refers to it (1879, p. 98) as "quite common in the upper Cumberland waters." Soper (1928, p. 83) took one specimen near Blacklead Island, Cumberland Sound, on August 18, 1924.

Larus marinus Linnæus. GREAT BLACK-BACKED GULL.

Kumlien (1879, p. 99) observed this species at Cumberland Sound, Baffin Island, only in late autumn. Preble (1902, p. 79) states that "like the Iceland Gull, [it is] very probably to be found, at least during migrations, inhabiting Hudson Bay." Neither Eifrig (1905) nor Low (1906) mentions any record of the species for Hudson Bay. Bent (1921, p. 85) includes the "coasts and islands of northeastern North America" in the breeding-range.

Mr. Ford told me he had seen the "Saddler" a few times along the cliffs at the north-eastern end of Coats Island, at Cape Préfontaine, where it may possibly have nested. Neither Mr. Ford nor any of the Eskimos remembered having seen a Great Black-backed Gull anywhere on Southampton. Soper (1928, p. 83) characterizes it as "a rare gull on Baffin island." Mr. Swaffield did not take a specimen at Mansel Island, and we did not see it anywhere along the west coast of Hudson Bay during the fall of 1930.

42. *Larus argentatus smithsonianus* Coues. HERRING GULL.²⁹

(Plate XIII, fig. 4)

Eskimo Name: The Southampton Eskimos called all the larger gulls *Nowyah*, and since the Herring Gull was decidedly the commonest of these bigger gulls, the name became attached principally to this species. Adult birds in full breeding plumage were sometimes called *Nowyahvik* in acknowledgement of their large size, or perhaps because of their handsome plumage. I did not hear any other words for young gulls in other plumages.

Status: The Herring Gull is an abundant and widely spread summer resident, not only all along the coast, but on the larger lakes inland, where it nests sometimes in large colonies. In the extreme eastern part of the Island it is not so common as at South Bay. At Walrus Island its place is taken by the larger Glaucous Gull. It is not as common at Cape Low as it is a short distance to the eastward.

It is almost never seen in mid-winter. Both the Glaucous and Ivory Gulls have been noted in winter, but the Herring Gull definitely moves south during the fall. It returns early in the spring, however, and lives for a time along the floe. It makes its way inland long before its home-lakes have thawed, and gathers in flocks on the ice-girt islands where it is later to nest.

The specimens of Herring Gull actually taken on Southampton during my stay are all, apparently, referable to *smithsonianus*. I think it likely that during migration, however, *thayeri* is to be found; and this belief seems the more plausible in view of the fact that the so-called Kumlien's Gull (*Larus leucopterus* x *Larus argentatus thayeri*) has been recorded at least twice in the region.

Fall Records: The Herring Gull was the first species I noted upon my arrival at Southampton on August 17, 1929. A flock of adult birds circled about the *Nascopie* in the harbor, eating the food which was thrown out from the galley. From August 17 onward it was seen virtually every day, until the middle of the fall. It was especially common in the vicinity of the Post, where several pairs nested on the nearby lakes, and where there were a few colonies of considerable size on some of the suitable small islands in the larger lakes, and on offshore islets in the Bay.

On August 19 I saw several pairs east of the Post, and judged from their behavior that they had young in the vicinity. On August 25 I found a fair-sized colony on a small island in a large lake about six miles inland from the Post. From the shore I could see the young birds standing stiffly around, apparently unable to fly. There must have been twenty-five pairs of adults in this colony.

On August 23 not far from the Post I shot a handsome female specimen, which had a distinct rosy flush all over the breast and belly, the first such coloring I had noted in this species. On the same date one of the Eskimo boys brought me alive a young gull, which was unable to fly. On August 24 an adult male (not fat) was collected. It was in perfect breeding-plumage, the post-nuptial moult not yet having begun.

²⁹It is the opinion of the author that this bird should be called the American Herring Gull, to distinguish it, in the vernacular, from the European race.

On August 25 about one hundred pairs were noted at Prairie Point. Here the birds were not nesting together in a distinct colony, but were scattered about over the tundra, or on islands in the lakes. I noted that the Arctic Terns chased the gulls a great deal.

From August 27 to 31 comparatively few Herring Gulls were seen in the vicinity of Four Rivers and Hut Cove. At the latter place, however, I found a large colony on a lake about a mile inland. Here, not far from a wet plain, where there were many old nests of the Whistling Swan, I encountered a great flock of *Novyiah*, all resting in the grassy islands, where they had reared their young. When the old birds circled about, the young called out and ran along the edge of the island in considerable excitement. When I started to wade out to the island they flapped off unsteadily. Some of them had comical difficulties in trying to alight in the strong wind.

On September 1 many birds were noted at Hut Cove and at the mouth of the Ranger River, where there was another colony. All the young birds at Cape Low appeared to be on the wing.

On September 7 I shot an adult female, which was in the midst of the post-nuptial moult. The tail in particular was very irregular in appearance. On September 8 a crippled bird, which had a blood-stained patch of feathers in the neck, persisted in coming close to our motor-boat for food. It was one of the tamest gulls I ever saw. It was only because of my special request that the Eskimo boys did not kill the bird in play.

When we returned to the region of the Post, we found all the young gulls there flying. The rearing of the young in that region is often considerably delayed, because of the constant robbing of the eggs by the Eskimos. On September 13 I noted that the adult birds were still travelling inland with food for the young. On this date I shot a young female, which flew clumsily toward me. Upon examining it I found there was much down clinging to the plumage. I think it had scarcely learned to fly. It was not fat.

On September 16 I noted that among the adults the post-nuptial moult was at its height. All of them had stubby tails and jagged-edged wings. In one specimen which I shot, the incoming rectrices were about two inches long; all of them were of about the same length, but none protruded beyond the tips of the under tail-coverts. I could not see that the flight of the birds was much affected by this abbreviation of the tail.

On September 18 I examined three young birds, which had been killed for food by the Eskimos at Native Point. These birds had fish remains in their stomachs. On September 19 many were noted at sea between Native Point and the mouth of Lake Brook, most of them in dark plumage. At Lake Brook great flocks assembled in the evening to feed; later they all roosted on one of the flat sand-bars not far from the shore. I collected a young male on this date.

On September 20 great flocks were seen about the carcass of a whale, which lay sprawled upon the beach. Most of these birds were adults in the moult, but there were a great many dark-colored young, as well as variously colored older birds, some with a sub-terminal black band on the tail. I shot one such bird, a female. Many of these strangely marked birds were not moulting, and I am of the opinion that such birds probably had not nested during the past season.

At Seahorse Point September 21 to 23 a flock of Herring Gulls was to be seen almost all the time in the harbor near our anchored motor-boat. On the last-named date I collected an adult female, which had almost completed the moult, and which was therefore in almost perfect winter-plumage.

On our trip from Seahorse Point to the Post, Herring Gulls and a few Glaucous

Gulls followed us most of the way. The Glaucous Gulls disappeared before we reached Native Point, but the Herring Gulls continued to drift along above our wake, looking for food.

On September 30 in the vicinity of the Post I collected a male in full breeding-plumage, and two young birds, both males. On the same date I observed for some time a pair of gulls at the head of the Bay. Both these birds were in full breeding-plumage and both scolded at me, as I walked about, so I think they must have had young. It appears that the post-nuptial moult is definitely delayed until the young are well developed, no matter how much the destruction of the first set of eggs may delay the hatching of the brood of the season.

During early October gulls were seen in the Harbor nearly every day, though they were not numerous, and it appeared that most of the nesting birds had disappeared. On October 9 fourteen were seen, resting on the water. Most of these were adults.

On October 10 I observed what I think must have been some sort of migration. From about ten o'clock in the morning until late in the afternoon Herring Gulls continued to pass along the outer rocks at Seal Point, moving rapidly along about two hundred feet in air, passing eastward in small companies, usually two or three birds at a time. Hundreds of birds passed during the course of the day. They were not searching for food, as they moved along, and they seemed to be headed for the high country at Ittuachuk, though why they should want to go there at this time of the year is beyond me. Adult and young birds appeared to be about equally numerous. The largest bands noted were of eight and nine individuals. The small flocks flew along about half a mile apart, so that birds were in evidence nearly constantly all day long. I had expected this migration to be followed by a drop in temperature or by a storm. On the following day there was a heavy fog, to be sure, but there was no storm, and the temperature remained about the same. The Eskimos told me they thought the birds had located a dead whale somewhere.

The freezing of the harbor forced the birds to leave the head of South Bay. About thirty birds were seen north of the Post on October 13. Most of these were adults. They were feeding upon something which they got beneath the surface of the water and for which they had to reach with their beaks. Sometimes they flew up to shake the water from their plumage, or to seek a new feeding-ground. Occasionally they dived from the air, but their bodies never went completely under the water. On October 14, 15, 16, 17, 19, and 24, the species was recorded in the vicinity of the Post. One or two birds were seen on each date. On the last-named date a dark colored immature bird was seen flying northward. On this date there was an east wind, which blew much of the ice out of the harbor. The species was not seen again at South Bay that season.

During the fall I noticed that the gulls fed principally upon fish and marine animals of one sort or another. Most of their feeding was at sea. They did not attempt to catch any young birds, so far as I could see, though they did occasionally course about over the ground, as if hunting lemmings.

Winter Records: The Eskimos told me that this species was never seen during the dead of winter. Father Thibert and a party of natives did see and try to shoot a young bird, a "black" gull, which flew over their *komatik* a few miles east of Cape Low, on November 14. By this time the waters of South Bay were frozen shut, but the floe in the region of Cape Low was probably not far out from shore.

Spring Records: On April 26, 1930, at the edge of the floe in the vicinity of Native Point we saw a flock of ten birds about the carcass of a walrus, which Amaulik Audlanat had killed on a preceding trip. Seven of these were fully adult, and two were dark-colored young.

I did not get very close to them, since they were very wary, but I examined their foot-prints in the snow, and am sure there were no larger or smaller species among them.

The Eskimos told me that this was the usual time of arrival along the floe for these birds. Upon consulting the diaries at the Post I found that in 1927 the first gulls had been reported from the vicinity of Bear Island on April 27.

From May 7 to 15, while we were at the floe, we saw a few Herring Gulls every day. I never saw more than two individuals at one time. They were always exceedingly wary, kept well out from the edge of the ice, and seemed always to be bound for some distant point. Nearly all these birds appeared to be adults. One bird came quite close to us after we had hauled a seal in from the water.

On May 19 the first bird was noted inland. The day was rather bright and springlike. Jack Ford saw one circling high above the buildings at the Post.

On May 25 an adult bird was seen flying southwestward over the Post. From May 26 to 29 a few birds, not more than three in a flock, were seen each day at the Post, and many were observed along the floe in the vicinity of Native Point. According to the diaries of the Post, the first gulls seen inland during the spring of 1927 were noted on May 30, when a "flock" flew northward over the Post. I think it probable that single birds or small flocks, scouts as it were, had gone inland from the open water prior to this date.

On May 31, 1930, I saw a single bird soaring about the head of the Bay, as if looking for open water. On June 1 I saw one drifting about above a rock in a frozen lake, where a colony was known to have nested during the preceding year.

On June 2 I followed two birds along the shore of the ice-bound Bay, until I saw them alight in the distance. When I finally came up to these birds, I found nine adult gulls perched on a rock in the middle of a frozen lake. Facing the wind, their white plumage almost merging with the snowy background, they sat in a dignified company, while the snow whirled about them in thick clouds. I noted a good deal of excrement on the rock, as if the birds had established themselves there some time previously. They all screamed and circled about above me, when I stood up on the rock.

On June 5 I saw six birds in the vicinity of the Post, and watched one catch a lemming in the snow. There is no doubt in my mind that these early inland arrivals live almost altogether on mice, though Mr. Ford told me that he had seen them following the *komatik* trails and eating the frozen droppings of the Husky dogs. By the time some of the smaller birds arrive, these too are probably eaten to some extent by the gulls, though lemmings are probably the most dependable source of food.

On June 6 I saw ten birds, which appeared to be mated. I collected a male and female, and found them both to be fat and in good condition. The gonads of both were enlarged. In the stomach of the male were the remains of a Lapland Longspur. The stomach of the female was empty.

On June 8 it appeared to me that most of the summering Herring Gulls had arrived in the South Bay region. I collected a male, which was very fat. The gonads were much enlarged, but the stomach was empty. The birds at one of the colonies gave cries, which sounded like the whining of a team of dogs.

On June 9 many were seen at Prairie Point, probably one hundred birds in all, and a female was shot. This specimen was not fat, but the gonads were much enlarged. In the stomach were the remains of a lemming. On this date we found on a large boulder in the snow-covered tundra a newly built (or newly lined) nest, which appeared to be ready for eggs. When we came near this nest the gulls flew about over us, scolding noisily and at-

tracting other gulls to the scene. I was much surprised to note that the Husky dogs refused to eat the body of the gull I shot on this date.

On June 10 many were noted by Jack Ford and Santiana at the head of the Bay. On the following day Jack Ford reported that he had found many nests ready for eggs on some of the rocks and grassy islands, where the birds had been known to nest for years.

On June 13 I shot a sub-adult female bird, the only such specimen I had seen thus far during the spring. From the condition of the ovaries I think this bird was mated and ready to lay eggs. In the stomach were the remains of a lemming.

On June 15 I shot a male (very fat) which had three bare spaces among the plumage of the belly, as if it had been incubating. However, no eggs had been found by anyone at this time, so I think the bird must have pulled the feathers out in preparation for the incubation period.

On June 16 the first egg was found. At a colony about four miles north of the Post eleven nests were examined, and two of these held one egg. On June 17 Father Fafard found several nests at an inland colony and took one egg each from two nests.

On June 18 many nests were found at Itiuchuk, but none of them held eggs. On June 19 Santiana found two nests, each with one egg, at Prairie Point. On June 20 many nests were found at Prairie Point, and six nests each with two eggs were found. On this date I saw a gull viciously attack a wounded Parasitic Jaeger.

On June 22 two sets of two eggs were collected at Prairie Point: thirteen of the forty-one nests examined held two eggs; twenty held one egg, and the rest were empty. The nests, which were situated on the little islands in the lakes were usually built of grass and moss, and were not, as a rule, very elaborately constructed. Nests, which occupied a single boulder in the middle of the tundra, or in a lake, were much more bulkily constructed, and were warmly and deeply lined with moss, grass, and a few feathers. I noted that these gulls rarely nested in a colony near a colony of Arctic Terns, but single pairs frequently nested near the terns and appeared to live amicably with them, so long as they were not disturbed. Whenever we came near, however, and the terns became excited, they flew viciously at the gulls, and drove them away without delay.

On June 28 I collected a male, which had been incubating. The stomach was full of lemming fur and bones. Since it was possible for these birds to find food in the salt-water by this time, it appears that they actually preferred to feed upon lemmings.

On June 29 I visited some of the small offshore islands in the Bay and found a few pairs of Herring Gulls nesting there.

On July 3 a nest containing three eggs was found on a small rock in a medium-sized, shallow lake. The nest completely covered this rock. The incubating bird could be seen at some distance. While I was at the nest, the bird dived at me fiercely, coming very close to me several times. The cries of these alarmed and attacking birds were the familiar *kow, kow, kow*.

On July 17 at Prairie Point a nest with three eggs was found. The eggs were apparently at the point of hatching.

On July 18 Keetlapik brought in a live downy young, which had just hatched. We photographed this bird. From this date onward young birds were seen everywhere, though occasional nests with eggs were found at the well-known colonies, which the egg-hunters had visited earlier in the season.

On July 28 I saw a pair of gulls chasing two young Pacific Loons. The gulls appeared to be trying to catch the baby divers, but they may have been only playing. I did not see any Herring Gull trying to capture young ducks or terns.

Annual Routine: The Herring Gull does not, as a rule, linger anywhere in the latitude of Southampton Island during the winter. According to Bent (1921, p. 120) the winter range of the species is from the Great Lakes and the Gulf of St. Lawrence southward. Birds, which are seen in Hudson Bay in late October or November, are probably stragglers, or cripples.

It arrives early in the spring, however, making its way along the floe in latter April and early May, and, unlike many of the other water-birds, flying inland to its nesting-grounds without much delay. While at the floe, it lives upon marine food of one sort or another; but, when it moves inland it catches lemmings, eats offal, and probably, in the snowless areas, swallows such food as seeds and berries. By the time the birds fly inland, most of them are mated, and they make their way promptly to the places where they have nested for years, some of them to rocks in the lakes where colonies nest, others to favorite boulders in the tundra, or to little rocks in the lakes, where isolated nests have been built. The nests are relined or freshly built, long before the snows have disappeared, or the lakes thawed out, and even the eggs may appear before the nest is surrounded by water. The nest is usually built of moss and grass, with a good deal of peaty humus and some roots as foundational material. The eggs are usually two, but often three in number.

The young stay in their nests for a time, then wander about on the tundra nearby, hiding, whenever danger threatens, by merely squatting on the ground. The parents capture much of their food in the ocean. By the time the young are abroad, the adults begin their post-nuptial moult. They continue, however, to frequent their nesting-grounds, until the young are well able to fly, whereupon they all go out to the salt-water, fly up and down along the shore, seeking offal and fish and eventually, as autumn advances, make their way southward, sometimes in definite, though loose, migratory flocks.

The Herring Gull captures a great many lemmings, not only during the early spring, when other food may be scarce, but all through the summer. It also catches some small birds, especially during early spring, when these birds may be weak from starvation or exposure. But it is an enemy of bird-life chiefly because of its eating the eggs of the various ducks, geese, and shore-birds. I did not actually see it capture the young of any sort of bird, though I saw it chasing young Pacific Loons; but I several times saw it searching for and robbing the nests of the Hutchins's Goose, Lesser Snow Goose, Northern Eider, King Eider, and Old-squaw, and I do not doubt that it takes any eggs it can find.

The principal enemy of the Herring Gull is the Eskimo, who gathers the eggs during the spring, and kills the young and adults for food. The day of the bird-bone needle and other implements of this sort, of course, is past, but the skins of gulls are still used for towels and the feathers for pipe-cleaners, gun-oilers, and so forth. The White Gyrfalcon is said to occasionally attack and kill this species.

Since the Herring Gull frequently nests on islands, the eggs are not often eaten by the Arctic Fox, though nests which are built on boulders in the prairie country may occasionally be robbed by this mammal.

Fleshy Parts: The eye of the downy young is dark brown, or blackish, with a bluish pupil. The eyelids, bill, and feet are about the same shade of brownish flesh-color, the bill being somewhat brighter than the feet. In young birds just able to fly, the bill is dark horn-color, somewhat lighter at the base; the feet are brownish flesh-color, and the eyelids dull flesh-color. The eyes are dark brown. As the young grow older, their bills become lighter and yellower and their feet more pinkish. A sub-adult female taken on June 13 was colored thus: bill, dull yellowish green with a dusky tip bordered posteriorly with a dab of

dull orange; feet, fleshy white or gray; eyelids, pale greenish yellow; eyes, yellowish white about the pupils, grayer at the edges.

Fully adult birds have pale yellow eyes and eyelids, which vary from dull straw-yellow to bright yellow-orange; the bill is usually yellow with a subterminal orange spot on the under mandible. In one specimen (a male) there was a small dusky spot near the orange spot on the under mandible. The feet are pale flesh-color, sometimes almost white, sometimes decidedly pinkish.

Other Records: The Herring Gull is so widely distributed and so traditionally a part of life at sea that it is not surprising that the early voyagers make no special mention of it in their writings. Hudson himself speaks several times of "sea-fowle," giving the impression that these are different birds from the "Willicks"²⁰ captured in such great numbers in the region of Cape Wolstenholme. Rae apparently did not take a specimen at Repulse Bay. Kumlien (1879, p. 67) found it not uncommon at Cumberland Sound, Baffin Island. Preble (1902, p. 79) says of its occurrence in the Hudson Bay region: "Common on Lake Winnipeg, Hudson Bay, and all the intermediate lakes and larger rivers, and breeding throughout the region. It is usually very shy, however, as it is shot for food by the natives whenever opportunity offers. . ." Eifrig (1905, p. 236) says: "Three adult specimens were taken at Cape Fullerton May 29 and June 10 and 15. They had broken shells, seeds, berries, and one a crab, in the stomach. Common on Hudson Bay and Strait, but not common further north." Low (1906, p. 316) says: "Very common in Hudson Bay; less so in the northern waters, where its place appears to be taken by the Fulmars and Skuas. Skins and eggs from Fullerton." Bent (1921, p. 119) states that the northern limit of the breeding-range of this subspecies is uncertain, and suggests that at about this latitude in Hudson Bay it intergrades with *thayeri*. Mathiassen (1931, p. 28) recorded it near Kûk, Duke of York Bay, during the last week of August, 1922. Taverner (1926, p. 55) states that "the breeding-range of these two forms [*smithsonianus* and *thayeri*] requires further investigation." Dwight (1925, p. 181) says: "The race *smithsonianus* breeds in the interior and along the southern coast of Alaska, and adjacent portions of British Columbia and on the lakes of southern Canada and the northern border of the United States to the Atlantic coast, where colonies occur from Maine to northern Labrador and Hudson Bay. The race *thayeri* breeds north of Hudson Bay to Ellesmere Land and west in the Arctic archipelago to Banks Land."

Mr. Ford found the Herring Gull abundant when he first landed on Southampton Island in 1924, and regarded it as one of the commonest birds at Coats Island.

Regarding the ranges of the Herring Gull in Baffin Island, Soper (1928, p. 84) says: "It seems probable that the breeding ranges of *L. argentatus* [*i.e.* *smithsonianus*,²¹] and *L. thayeri* overlap somewhere between Cumberland Sound and Ponds inlet."

Mr. Swaffield preserved a specimen (taken in mid-summer, probably from Mansel Island, where it doubtless nests (Sutton, 1932a, p. 42). We found it common in the vicinity of Chesterfield and Marble Island during the fall of 1930 (Sutton, 1931c, p. 159).

Larus argentatus thayeri Brooks. THAYER'S GULL.

There can be no doubt that this northern subspecies of the Herring Gull migrates through the Southampton region. It may, in fact, do so regularly. Furthermore, it may occasionally nest in the northern part. We did not, to be sure, take a specimen of *thayeri*, but we recorded

²⁰Probably Brünnich's Murres.

²¹According to the Committee of the American Ornithologists' Union (1931, p. 132) the American race of the Herring Gull is distinct from the European form, *Larus a. argentatus* Gmelin. Most references to *argentatus* in America therefore apply to *smithsonianus*.

the so-called *Larus kumlienii*, which is now regarded as a hybrid between Thayer's Gull and the Iceland Gull, and, if such hybrids migrate through a given region, it stands to reason that the parent stock also migrates through the same region, at least to some extent.

Dwight (1925, p. 181) says that this form breeds "north of Hudson Bay to Ellesmere Land . . .", although Bent (1921, p. 122) includes Cape Fullerton in the breeding-range and quotes an earlier statement of Dwight's to the effect that "breeding birds of Fort Chimo, Ungava, are *argentatus*³² [that is *smithsonianus*], and those of Cape Fullerton, north of Chesterfield Inlet, not quite typical *thayeri*, but farther north and west all the birds are *thayeri*."

Mr. Taverner, in a letter to me, dated February 8, 1931, says: "My study of the species leads me to believe that in the eastern Arctic *argentatus* [*i.e. smithsonianus*] is the bird of southern Baffin Island and Thayer's of northern Baffin Island and northward. In the western Arctic, Thayer's comes southward to the main coast. Breeding birds which Soper took near Cape Dorset and thereabouts are all *argentatus*. Specimens obtained at Pond's Inlet and North Devon are *thayeri*. I seem to have . . . a specimen from Cape Fullerton that at some time I identified as *thayeri*, but as others are undoubtedly *argentatus*, I would have to re-examine it before committing myself."

Soper's remarks (1928, pp. 83 and 84) on the distribution of "*argentatus*" and *thayeri* in Baffin Island bear out Mr. Taverner's statements.

Larus philadelphia (Ord). BONAPARTE'S GULL.

Preble (1902, p. 80) says this species is recorded "from several places on Hudson Bay." However, neither Eifrig (1905), Low (1906), nor Soper (1928) mention its occurrence in the Southampton region, and Kumlien (1879) apparently did not take it on Baffin Island. Bent (1921, p. 179) includes Southampton Island in the breeding-range, basing the statement upon an egg said to have been collected by Captain Comer with the parent birds and forwarded from the Island to Professor Verrill at Yale.

In a letter dated January 20, 1931, Dr. Louis B. Bishop has courteously written me concerning this egg, as follows: "The Bonaparte's Gull egg, to which you refer, I remember distinctly. Captain Comer in the nineties spent several winters in Hudson Bay, at least one of them on Southampton Island.³³ He had collected formerly for Prof. Verrill of Yale, and from two, I think, of his trips to Southampton he brought down a number of birds and eggs to Al. Verrill, and I had my pick of them. This egg was in one of these lots, and my impression is he sent Bonaparte's skins at the same time. I am sure he did not send any Sabine's Gulls, as I had few of that species at that time."

In a more recent letter, Dr. Bishop informs me that this egg was collected on July 3, 1905, and makes the accompanying comment: "Probably the egg of the Bonaparte's Gull is that of Sabine's, as I believe that is the breeding bird on Southampton. From geographical reasons I then believed it would be Bonaparte's."

Since I did not collect, nor even see, a Bonaparte's Gull during my entire stay on the Island, and since this species is now conceded to be a tree-nesting form,³⁴ I am inclined to think that the birds, upon which Bent bases his statement, or upon which Dr. Bishop based his earlier identification, must have come from some other region than Southampton, or have been mid-summer wanderers which chanced to be shot at a Sabine's Gull colony. The Sabine's Gull is known to nest commonly, though locally, on Southampton; but since there

³² *Larus argentatus argentatus* is the European Herring Gull, *L. a. smithsonianus*, the American form, is considered specifically distinct (A. O. U. Check-List, 1931, p. 132).

³³ Judging from Captain Comer's own statements regarding the matter, he did not actually spend the winter at Southampton, though he did hunt for whales in the adjoining waters, and he made many visits to the Island during the summer.

³⁴ It is conceivable that the Bonaparte's Gull, like the Herring Gull, nests both on the ground and in trees. So far as I know, however, the only known nests of Bonaparte's Gulls have been in trees, usually at some distance from the ground; and assuredly there are no trees on Southampton of sufficient size to attract the birds, the largest being mere bushes, usually willows. No coniferous trees, whatever, are to be found.

seems to be some confusion as to the material upon which Bent's statement is based, I feel scarcely justified in giving Bonaparte's Gull full rank in the present list.

Genus PAGOPHILA Kaup.

43. *Pagophila alba* (Gunnerus). IVORY GULL.

Eskimo Name: As has been noted previously, the word *Nowyah* is used among the Southampton Eskimos to signify gulls in general. The special name for this rare species was, apparently, *Nowyahwah*, the name applied in Baffin Island to the Atlantic Kittiwake, according to Soper (1928, p. 81), who gives the name of the present species as *Nowyaharsuk*. Hantzsch (1928, p. 123) gives the name of the Ivory Gull as *Naujaluk*, the *luk* suffix signifying "poor, perhaps on account of the small size."

Status: The Ivory Gull is a rare and irregular migrant more frequently recorded in the fall than in the spring. It has been seen and taken also in the dead of winter. According to Amaulik Audlanat and other Eskimos it does not nest anywhere on or about the Island.

Records: During the late fall of 1929, the Eskimos who hunted in the vicinity of Native Point saw a few Ivory Gulls every day for several weeks. Their descriptions of the birds fitted no other species. They did not collect any specimens because they thought I did not need them. The birds were quite tame, and came to feed on the refuse whenever a seal, walrus, or white whale (*kellitughak*) was killed. One bird, which had been killed with a stone, I did not have opportunity to examine. Descriptions of these birds were given me in considerable detail by Kooshoak and Eevaloo.

In mid-November (exact date uncertain), Munnapik's son shot an Ivory Gull (adult) near Munnimunnek Point, but it was skinned out crudely and used as a towel by the women before I could get it. Munnapik used some word in describing this gull which was probably the equivalent of "creature of the ice," but I did not write his word down. No other *Nowyahwah* were seen at Munnimunnek during the entire fall, according to Munnapik.

On July 28, 1930, Amaulik Audlanat secured for me a fine male, apparently an adult, which was in the post-nuptial moult. It was nearly pure white. There were flecks of grayish in the loreal region, along the edge of the mouth (rictus), in the secondaries, and on the under wing-coverts on the manus. The bill, which I sketched in water color, as soon as I could after receiving the specimen was *light squill blue*³⁵ to *pale Nile blue*, brightest at the base of the lower mandible, and in the region of the nostrils, and fading through *pale sulphate green* and *light fluorite green* to *chartreuse yellow* at the tip, along the culmen, and the tomia of both the upper and lower mandibles. The eyelids and feet were dull black. The eyes were deep, rich brown. The large size of the eyes and perhaps also the texture of the plumage gave the face somewhat the expression of that of a large pigeon. The specimen was very fat, and the gonads were small. I could not find any bare patches on the belly indicative of incubation. The stomach contained a few tiny bits of molluscan shells. Both rectrices and remiges were moulting; so much so, in fact, as to give the spread wings and tail a most bedraggled appearance. The body plumage, however, appeared to be altogether fresh, so I should say that the post-nuptial moult had almost been completed. Amaulik Audlanat told me that this bird was shot near the ice not far from Walrus Island, and that it was the only *Nowyahwah* seen on their several walrus-hunting trips that season.

³⁵The impression is given by some writers that the bill of this species is predominantly yellow. I have not seen Ivory Gulls in the flesh at different seasons, to be sure, but in the specimen collected at Southampton the bill was certainly dominantly *blue*, not *yellow*.

All italicised words in the above detailed description are from Ridgway's *Color Standards and Nomenclature*.

Other Records: The Eskimos all told me of seeing Ivory Gulls during late fall and winter. Mr. Ford said that he could not remember a previous fall, when several had not been seen during the course of the season. In November of 1928, Kyakjuak caught a pure white, black-footed gull in one of his fox-traps which was brought in to the Post and identified by Mr. Ford as a *Nowyavah*.

Richardson (Swainson and Richardson, 1831, p. 419) describes a specimen killed in Hudson Bay. Rae apparently did not take it at Repulse Bay. Kumlien (1879, p. 99) found it about Baffin Island in the fall but did not see it in the spring. Both Eifrig (1905, p. 235) and Low (1906, p. 315) mention a young bird killed on September 22, 1904, at Cape Fullerton, and Low states that "occasional birds of this species were seen in the early summer among the heavy ice . . . in Hudson Strait." Mathiassen did not see it in 1922. Mr. Ford did not remember seeing it at Coats Island. Soper (1928, p. 81) says that "one juvenile was collected at Pangnirtung fiord [Baffin Island] on October 24, 1925." Mr. Swaffield took an immature specimen at Mansel Island on November 25, 1929 (Sutton, 1932a, p. 42). We did not see it along the west coast of Hudson Bay during the fall of 1930.

Genus *RISSA* Stephens.

44. *Rissa tridactyla tridactyla* (Linnæus). ATLANTIC KITTIWAKE.

Eskimo Name: According to Soper (1928, p. 81) the name of this species on Baffin Island is *Nowyavah*. In Southampton, the *Nowyavah* was the Ivory Gull. Hantzsch (1928, p. 123) gives the name of the Kittiwake as *Nautsak* (meaning "pretty [gull], on account of the gracefulness of the bird"). Amaulik Audlanat, Mr. Ford, and I had a considerable conversation about the matter and finally decided that *Nowyahlutuuapik* was the correct name for the species. The precise meaning of this word I do not know.

Status: The Atlantic Kittiwake is a rare migrant in the waters about Southampton. It probably wanders westward through Hudson Strait from the Atlantic coast. It does not nest anywhere on or near Southampton, according to natives who have travelled throughout the region.

Records: On July 16, 1930, Amaulik Audlanat and his party of Eskimos, while hunting for walrus among the ice south of Native Point twice saw a solitary Kittiwake flying along the edge of the floe. They described the bird as "like a Herring Gull, with black wing-tips and white head, but of the size of *Imakotailak*, the Arctic Tern. The Okomiut native, Eenook, had shot one earlier in the season near Munnimunnek Point, but he had failed to bring it in.

On July 22 Amaulik Audlanat saw and shot one at Walrus Island. The mangled remains of this specimen were brought in on July 24.³⁶ It was an adult apparently in full breeding-plumage. Shookalook also saw a Kittiwake along the floe in mid-July. On July 30 Jack Ford and a party of walrus-hunters saw one among the ice near Bear Island, about eight miles from the Post.

Other Records: Sabine (1823, p. 695) states that the Kittiwake "abounds" in Hudson Bay. Richardson (Swainson and Richardson, 1831, p. 423) describes one which was killed in July on Melville Peninsula. Rae apparently did not take it at Repulse Bay. Kumlien (1879, p. 100) found it "by far the most common gull" at Cumberland Sound, Baffin Island, where it occurred as a migrant, but not as a breeding species. Preble (1902, p. 79) says that "a specimen from the Savage Islands, Hudson Bay, is recorded in the British Museum Cata-

³⁶These remains were preserved in formalin.

logue of Birds." Low (1906, p. 315) refers to it as "not very common in the northern part of Hudson Bay or elsewhere in the north." He records a specimen taken at Cape Fullerton. Mathiassen did not encounter it in 1922. Mr. Ford remembered seeing it once or twice about Coats Island. Soper (1928, pp. 81 and 82) records it from Baffin Island, principally along the eastern coast. Mr. Swaffield did not take a specimen at Mansel Island. We did not record it along the west coast of Hudson Bay during the fall of 1930.

Genus RHODOSTETHIA Macgillivray.

Rhodostethia rosea (Macgillivray). ROSS' GULL.

The first specimen of Ross' Gull was taken not far from Southampton Island, at Alagnak, Melville Peninsula, by James Clark Ross, in June, 1823, during Parry's second voyage (see Preble, 1902, p. 80). Preble continues: "Another was shot a few days later by another officer attached to the same expedition. These two birds served as the basis for Richardson's description of *Larus rossii* (Appendix to Parry's Second Voyage, p. 360, 1825), but this name is antedated by *Larus roseus*, inadvertently bestowed by Macgillivray previously. J. C. Ross later recorded it from Boothia Felix (Appendix to Ross' Second Voyage, p. xxxvi, 1835). The species does not seem to have been since taken in the Hudson Bay region." The only point near to Southampton mentioned by Bent (1921, p. 191) in the breeding-range is the "Melville Peninsula (Alagnak)" referred to above.

In view of the fact that the places mentioned by Preble are really not far removed from Southampton, it would seem that Ross' Gull ought occasionally to be found, especially in winter, about the Island. I, however, looked for it in vain.

Genus XEMA Leach.

45. *Xema sabini* (Sabine). SABINE'S GULL.

(Plate XVI, figs. 1-4; Plate XXII, fig. 14)

Eskimo Name: The Aivilikmiut were well acquainted with this lovely species and called it the *Akkigeriatsuk*, perhaps in imitation of its scolding cries. The Okomiut name for the bird, which was something like *Tookalookalook* was also, I think, onomatopoeic. Mr. Brandt tells me that the Alaskan Eskimos, with whom he came into contact, called it *Nacha-shunk*.

Status: Sabine's Gull is a fairly common, but decidedly local summer resident, known to nest principally in the western part of the Island, notably at Prairie Point, Four Rivers, Bay of God's Mercy, and at a few other places. It probably occurs also in the vicinity of East Bay; but it evidently avoids the high country along Fox Channel and at Seahorse Point; probably does not nest about Duke of York Bay, and is not found in the interior at all, to the best of my knowledge. It departs for the south early in the fall, and returns rather late in the spring.

Fall Records: When I landed at Southampton, Mr. Ford almost immediately showed me a handsome egg, which he thought was the egg of Bonaparte's Gull. I was thrilled at the prospect of finding a nesting colony of this little known species somewhere in the vicinity. On August 25 we made a special trip to Prairie Point, where these birds were known to have nested during the past summer. We soon found, however, that the "black-headed" gulls were not Bonaparte's Gulls, but rather Sabine's Gulls, and while I was disappointed at not finding the former species, I was charmed with the elegance of the little *Akkigeriatsuk*, which I had never before seen in life.

Jack Ford was kind enough to walk with me some distance inland in an attempt to re-

locate a nesting colony of the birds, about which he had known for years; but we were not successful in finding more than six birds, four of which I collected.

The country at Prairie Point was exceedingly flat. A mile or so inland from the rough, limestone beaches, the grassy prairies began, and through this swampy, monotonous country Jack and I walked, slushing along the edges of lakes, dragging our feet through muddy bottomed pools, often in water up to our waists, and making our way round great lakes, which were dotted with low, grass-topped islands. There were but few mosquitoes, though the day was warm and bright. About us flew hundreds of scolding Arctic Terns; Red-throated Loons passed continuously to the inland lakes, with fish in their slender bills; jaegers sped by, diving at us when we came too near their young, which were hiding in the grass.

All at once, against the blueness of the sky, I saw a small, dark-headed gull soaring among the terns. The light shone through its wings, revealing a striking pattern. A Sabine's Gull! I couldn't see that the tail had the slightest appearance of being forked, but it appeared to be *squarish* rather than rounded, as in a Herring Gull. How handsomely, even in the distance, the pink breast glowed against the sky! Scarcely had I noted these various field-marks satisfactorily when a young bird suddenly swooped down near me, circled about my head once or twice, then, after going through some of the oddest flight manoeuvres I ever witnessed, settled on the lake nearby. It kept up a continuous and well-nigh ear-splitting chatter. Soon it rose from the lake, came over to circle about me once more, then "tumbled" in the air, slid downward sidewise, righted itself, swooped about giddily, and then, with wings quickly lifted, once more came to rest upon the lake. It swam about in little circles, riding the water like a phalarope. Another bird eventually joined it, and the two kept up an intermittent chattering.

The parent birds were only mildly alarmed at my presence, but they finally drifted over within range, and I was able to collect the entire family. The pink plumage of the breasts of the adults was obviously faded, but all the birds, both young and old, were in good plumage, none being in the moult. None was very fat. The stomachs held the remains of some small fish and spiders. On the same date, two more young birds were seen flying along the outer shore, in company with Arctic Terns.

On August 28 not far to the east of Cape Low, three young birds flew over and about our motor-boat. On September 4 I found the remains of an immature bird about four miles inland at Four Rivers. The Eskimos told me there was a nesting-colony in the vicinity. There were no birds flying about on September 4, so they must have begun their migration by that time.

No Sabine's Gull was recorded in the region of the Post during the entire fall season of 1929.

From our meagre data it appears that this species leaves its nesting-ground very early in the fall, probably just as soon as the young can fly well; and that the adults do not enter upon the post-nuptial moult while they are about the Island. It may be that this moult is accomplished gradually, during migration, or that the birds assemble somewhere on Hudson Bay, there to complete the moult of the flight-feathers, and then go on southward.

Spring Records: On June 9 the Eskimo boy, Santiana, and I made a special dog-team trip to Prairie Point to determine whether the *Akkigeriatsuk* had arrived. The whole region was covered with at least eighteen inches of snow save where, on two or three unusually high mounds, the wind had kept the ground bare. The weather was not extremely cold, but our trip was not very comfortable; the dogs had considerable trouble hauling us through the snow; they whined constantly. They were a pampered team anyway, and we progressed

with patience-trying slowness. Though the sun was not shining, we had to wear our snow-glasses all the time on account of the glare.

There was not much to relieve the monotony. We saw a few geese and some Long-tailed Jaegers, in loose flocks. But the big *Nowyah*, or Herring Gull, appeared to be the only gull at hand. All at once, in the far distance, we spied some smallish birds beating slowly along, about twenty feet from the ground. Now and then one of them wheeled, dropped to the snow, and settled for a moment. They proved to be a flock of Sabine's Gulls, hunting food in the snow. On they came, straight toward us, scarcely seeming to realize that we were nearby. All nine of them flew more or less abreast across the wide tundra. Finally, in the far distance, they settled in what appeared to be an open patch of grass.

We turned the sledge and undertook a tedious chase. The dogs whined and looked longingly toward the Post. Santiana and I ran most of the time, so as to lighten the *komatik*. The birds flew while we were yet afar off, and continued their search for food. We didn't see them again for an hour, though before the twilight came they had passed us four times. I finally got one specimen, a female. This bird was fat; the gonads were somewhat enlarged; the stomach was *full*, principally of remains of what the natives called "snow-spiders;"³⁷ but there was some vegetable matter also, grass roots, perhaps.

On June 13 Jack Ford and Santiana found a colony of *Akkigeriatsuk* not far inland at the head of South Bay. They reported "perhaps a hundred" birds, not yet nesting. On June 17 Jack Ford saw three flying about the open water at the mouth of the stream west of the Post. Here, where the rushing torrent had dug away the salt-water ice, was a fair-sized lake where many water-birds were to be found, especially Arctic Terns. I saw a Sabine's Gull at this place on the following day, and also one at Itiuchuk, whence I had gone by *komatik*.

On June 18 we saw several about the little coastal lakes at Prairie Point. I collected two on this date, a male and female. Both were in good condition, fairly fat. The female had bare patches on her belly, and two well developed eggs in her ovaries. On June 20 I collected another male and female. In both specimens there were bare spaces on the belly. On June 21 a female was taken, which had a fully formed but soft-shelled and colorless egg in the oviduct.

Most of the Sabine's Gulls at this time were to be seen coursing along just inside the outermost rough, limestone beaches, in groups of three and four, or feeding in the lakes, ducking their heads, while searching for food among the decayed vegetation in the shallow water. They were not especially curious, nor were they at all disturbed at my presence. Their call-notes were sharp and rasping, somewhat reminding me of the scolding cry of the Arctic Tern; others of the sharp *rat-tat-tat* of the warning cry of the Ruddy Turnstone. It was not difficult to approach them, as they fed.

On June 22 I found the first nests. I was walking along the coast just east of Prairie Point, when in the distance I saw a flock of Arctic Terns circling about a large lake. Making my way to the lake, and wading out to the islets therein, I searched through the moss and grass for nests. Hearing a sharp, rattling note above me, I looked up almost into the face of a Sabine's Gull, which was poised above me, hovering. I finally counted six of these gulls, but found no nests. I was about to give up the search, when I noted a smaller, lower, and grassier island nearby, over which the gulls had been flying. While wading to this island, I was besieged. Soon I found two nests, only about ten feet apart, and each holding two

³⁷ These dark-colored Arachnids were to be seen moving about on the snow in early spring, especially on warm, bright days.

eggs. The nests were built almost in the water, for the island was very marshy. Grass stalks had been laid in neat, though shallow cups, about three feet back from the water's edge. The island was almost round, and perhaps twenty feet in diameter. The water about the island was three and one-half feet deep.

The parent birds came very close in their attacks, but did not actually strike me. Their usual call-note might be written *Túk-a-túk-túk-a-túk*, the "u's" all short. Another cry was a simple, harsh *kék*, rapidly repeated. The birds sometimes settled on the opposite side of the island while I was examining and photographing the nests. They were remarkably beautiful as they sat together in pairs, quietly watching me.

A pair of Herring Gulls had a nest on a large rock in this same lake. Whenever these large gulls came too close, the Sabine's Gulls doubled their speed and went after them furiously, darting at them recklessly while cackling loudly. To the numerous terns they paid not the slightest attention. I collected the two sets of eggs and found them fresh.

On June 23 I shot a male, which had been incubating three eggs; at least there were three incubation-patches in the belly-plumage. I noticed several pairs of birds chasing each other, and heard again the rapidly repeated *kék*, *kék*, *kék*, as well as a *ker-wee*, *ker-wee*, *ker-wee* and *kā-wee*, *kā-wee*, very rapidly given, with staccato sharpness. On this date I found ten more nests, some with two eggs, some with three, and spent much time photographing a singularly confiding bird, the sex of which I did not determine, as it sat upon its eggs. Birds which were not at their nests spent much of their time flying along the narrow, coastal pools, searching for food. They were noted frequently on some of the mud-bottomed ponds, where they fed by sticking their heads far under water as they swam along. I never saw a bird plunge under water from the air, tern-wise.

On June 25 Jack Ford and the Eskimos visited a colony south of Prairie Point, where at least sixty pairs were nesting. Most of the nests at this place held two eggs, but a few held three. A set of two and one of three were collected. The eggs were almost perfectly fresh. I saw no more Sabine's Gulls until July 17, when Jack Ford and I made a special trip to one of the Prairie Point colonies, four miles inland. Here, after a rather tiring walk, we found about one hundred pairs circling over an island-dotted lake, which was frequented also by a few Arctic Terns, a brood of King Eiders, and a pair of Pacific Loons. Though the gulls made considerable outcry as we waded out to the islands, we did not for some time find a nest, or young bird. Finally we spied a young one, swimming rapidly toward a little clump of grass near one of the larger islets. When I pursued this bird the parent gulls came out at me savagely, screaming so loudly that my ears rang. We finally caught two of the young, which were very small, and found a nest containing three young which had obviously just hatched.

The several empty nests, one nest with an infertile egg, and the one nest holding three young, were all situated near the water's edge, in the grass or moss. They were not deep; they were usually made of or lined with grass, and obviously they had not been very carefully constructed.

The young birds were for the most part silent. When in the water they held the head low, and swam rapidly trying to make off; but on the moss they lay quite still and did not attempt to escape. I found several dead young ones on the islands, one of which had a deep gash down the back as if it had been killed and dropped by a jaeger.

The parent birds attacked us fiercely when we bore down upon the young. Sometimes they hit us on the head so hard that they were momentarily stunned and wobbled drunkenly off through the air. Six specimens were taken. When a crippled gull fell into the lake, all

its companions gathered round it in great excitement, making such a commotion as terns are wont to make under such circumstances.

I noted that the birds sometimes voluntarily fell into the water, to attract our attention, swimming about with half-open bills, wings spread, and feet paddling irregularly. They did not employ such tactics on land. I never saw a tern behave in this manner.

When I had left this colony, I sat down on the grass at a considerable distance, and watched the birds. Soon they returned to their young, and resumed their feeding. Some of them walked rapidly about through the grass, searching for insects; others beat about over the prairies like Marsh Hawks, suddenly wheeling and dropping down upon their food. On the ground, their blue-gray heads merged so perfectly with the sombre tones of the background, that they appeared headless or even shapeless at a distance.

If we may assume that the birds at this colony laid their eggs at about the same time as those a few miles away, at Prairie Point, then the period of incubation must be between 23 and 26 days, for the young birds we found were all quite young, and some had just hatched.

On July 30 Jack Ford saw one bird near Bear Island. On August 4 we saw a few adults flying about near Bear Island. None was seen anywhere after this date.

Annual Routine: Sabine's Gull returns from the south sometime early in June, before the snow has left the tundra, where it nests. At such times it feeds upon such insects and spiders as it finds. When the lakes thaw, it returns to its favorite islands, and there makes its shallow, grass-lined nest. Two or three eggs are laid. Both sexes incubate. The period of incubation is probably between 23 and 26 days. The young are helpless at the time of hatching, but soon make their way to the water, where they swim readily. Both sexes defend the young with equal fervor. The young are fed largely upon insect food.

The southward migration is begun fairly early, apparently as soon as the young are well able to fly. So far as I could determine, the post-nuptial moult of the adults is not undertaken on the Island.

The enemies of this species are about the same as those of the Arctic Tern. In fact the two species are in many ways similar. They nest in similar localities, though the Sabine's Gull does not seem to prefer islands in the salt-water; and even their call-notes and behavior are similar. The Eskimos are fond of the eggs of both species and gather great quantities of them. Jaegers, larger gulls, hawks, and foxes, doubtless persecute the little gulls all summer.

Fleshy Parts: In a sketch of a newly hatched young (July 17) the eye is black; the eyelids pale neutral gray; the bill *hydrangea-pink*,* brightest at the base and fading into brown at the extreme tip; the feet and legs *pale cinnamon-pink* fading into pale *mineral-gray* at the ends of the toes. The claws are not black, but are the same *mineral-gray* as the toes themselves.

I did not make a sketch of the fleshy parts of the young in juvenal plumage, but noted that the bill was "dark brown" and the feet "blackish," so think that the colors of these parts must darken very rapidly. In the sketch of an adult (also made on July 17) the eye is dark brown; the eyelids almost *scarlet-red*; the bill black save at the tip which is *deep chrome-yellow*, lightest along the upper edge, and in the region of the nostril, where the red of the nasal chambers shows; the lining of the mouth *scarlet-red*, not quite so bright as the eyelids, and the tongue still paler; the feet almost *dull greenish black*.

Other Records: Richardson (1825, p. 360) speaks of many specimens procured at Winter Island, Melville Peninsula. Rae apparently did not take a specimen at Repulse Bay in

*All italicised words in these descriptions are from Ridgway's *Color Standards and Nomenclature*.

1846-47. Harting (Proceedings of the Zoological Society of London, 1871, p. 111) mentions a pair in breeding-plumage obtained off Melville Peninsula and presented to the University Museum at Oxford by John Barrow. Kumlien (1879, p. 101) mentions two observed in October, 1877, along the Baffin Island coast. Preble (1902) did not see it at Cape Eskimo. Eifrig (1905, p. 236) says: "This gull was common on Southampton and other islands, breeding there along the shores and the banks of small ponds in company with the Arctic Tern. They make no nest but deposit their eggs in the sand.³⁸ Two eggs were taken at Southampton, June 28, 1904. . . These birds were very inquisitive and not at all shy at Southampton."

Low (1906, p. 316) says: "Common in Roe's Welcome, about Whale point and on the Southampton side. Flies with the Arctic Terns and also builds its nest along with those birds on the small islands in the ponds of Southampton. Skins and eggs from Southampton island."

Bent (1921, pp. 191-196) includes Southampton in the breeding-range, and quotes part of Eifrig's account, given above. Among the items of food he mentions are "small fishes, aquatic worms, insects, and larvæ, and small crustaceans."

Mathiassen did not see it in 1922. Mr. Ford recalled seeing it in summer at Coats Island. Soper (1928, p. 85) calls it "a very rare gull in Baffin Island region." Mr. Swaffield took an adult on Mansel Island on June 2, 1930 (Sutton, 1932a, p. 42). We did not see it along the west coast of Hudson Bay during the fall of 1930.

Subfamily STERNINÆ

Genus STERNA Linnæus.

Sterna hirundo Linnæus. COMMON TERN.

Parry (1824, Appendix) lists the "Tern or Sea Swallow (*Sterna Hirundo*)" from the region north of Southampton, but I think it hardly likely that he identified the species carefully, and since he does not speak of *Sterna macrura*, probably confused it with the Arctic Tern. Neither Kumlien (1879) nor Soper (1928) recorded the Common Tern on Baffin Island. Preble (1902, p. 81) says "it may occur on Hudson Bay north to the Barren Grounds, in association with the Arctic tern, but was not identified with certainty thus far north." Low (1906) does not include it in his list of the birds of the Arctic Archipelago, but Eifrig (1905, p. 236) makes the following statement: "Seen in some parts of Hudson Bay. Not as plentiful as next species [Arctic Tern]".

To the best of my knowledge we never saw the Common Tern anywhere on Southampton Island nor in the region of Chesterfield Inlet, nor along the west coast of Hudson Bay north of Churchill during the fall of 1930 (Sutton, 1931c).

46. *Sterna paradisæa* Brünnich. ARCTIC TERN.

(Plate XIII, fig. 3; Plate XXII, figs. 9, 10)

Eskimo Name: The name for this species I wrote down was *Imakotailak*. Hantzsch (1928, p. 147) spells this name *Immerkotailak* and Soper (1928, p. 85) *Emakotailak*. Hantzsch gives Kleinschmidt's translation of this word as "without groin,"³⁹ reference to the "weak feet which almost disappear in the feathers."

It is my personal feeling that an entirely different explanation of the word may be

³⁸This description of the nest is indeed interesting in that it differs so markedly from that which we have offered. Probably these gulls, like the Arctic Terns, make different types of nests in different sections, varying the structure according to the material at hand.

³⁹From the Danish, *lyskelos* (see Winge, *Groenlands Fugle*, 1898, p. 204).

plausible. *Imak*, or a close equivalent, means *sea*. If *Kotailak* is an onomatopoeitic word, which may well be, then "*Sea Kotailak*" is really not an unsuitable name for the bird. Mr. Brandt tells me that in Alaska he heard the name *Tuck-kee-yah* applied to it.

Status: An abundant summer resident all along the coast, nesting not only on all available off-shore islands, but also on low, grassy islands in the lakes. The Eskimos told me it was to be found all about the Island, especially at East Bay. At South Bay great colonies were found at Prairie Point, near the Post on the larger lakes, and on the larger of the small Tern Islands, not far from the mouth of the Koodlootok River.

Fall Records: Arctic Terns were seen daily about the Post during the late summer and early fall of 1929; and five islands where they had nested during the spring were located. On August 19 I counted about twenty pairs which were flying about a narrow island in a large lake, but could not find any young. These birds scolded me a good deal, when I came near their island, and gave a sort of "song," when chasing each other high in air. This song I wrote down as: *kĕk, kĕk, kĕk, kĕk, kĕk, tee-kĕer, tee-kĕer, tee-kĕer*. Their movements were especially graceful, as they pursued each other in long sweeping dives, their tail-feathers curving and their primaries bending back as they swooped upward. The flight of the Arctic Tern, while usually considered graceful, has always seemed *floppy* to me; at times such as this, however, the tern proves himself a master of the air.

On August 20 I saw a flock of terns chasing a raven, which appeared to have some light-colored object in its bill, perhaps a young tern.

On August 21 I found a small colony in a large lake five miles north of the Post, where all the young were flying about with their parents. There were about ten pairs of adults and the same number of young, one of which I collected. At several of the colonies near the Post there were very few young birds or none at all. These colonies, I later learned, were so near the Post that the eggs were constantly taken, sometimes quite late in the season.

On August 23 I observed parent birds returning to inland lakes with slender fish held crosswise in their bills. One bird, a male with incubation patches in the belly plumage, attacked me fiercely as I walked along the shore. At one of the colonies the young birds joined in besieging me. They dived at my head, flew low above me, and kept up such a wild and frantic outcry, that I waved my arms to frighten them away. Two immature birds were collected on this date. Both were quite fat. An adult male collected was, however, very thin.

On August 25 we visited a vast colony of Arctic Terns at Prairie Point. Here, where the big shallow lakes just inland from the salt-water are crossed by limestone gravel-bars, and dotted with innumerable islands, thousands of terns swarmed, rising like fluffy clouds, as we approached, and filling the air with their crossing and recrossing forms. The din was unbelievable. So incessant and noisy was the outcry, that after the first ten minutes I was weary of the racket. Birds dived at me from all sides. Many of them actually hit me, pecking my forehead with their sharp bills, as they passed. Our presence and the outcry from the colony of terns attracted first a pair of Parasitic Jaegers, then a nearby colony of Herring Gulls, and finally a young Duck Hawk. All these newcomers were promptly besieged by the terns with great energy, and driven away from the lake.

We did not find any eggs at this late date; but the young were in many stages of development, some probably only a day or two old, others just learning to fly, and many safely on the wing. I caught and photographed several. They ran and swam exceedingly well, and their coloration was so highly protective that when they squatted on the coarse gravel it was nearly impossible to see them.

The parent birds, when not attacking us, busied themselves catching fish in the salt-water and bringing these in to the young. Frequently they dropped a fish only to catch it again in mid-air.

I noticed that the feet and bill of young birds a day or two old were considerably brighter than in somewhat older birds, which were just learning to fly. The eldest of the three young birds collected was quite fat. All had remains of small fish in their stomachs.

Arctic Terns were seen daily on our trip to Cape Low. On September 1 they were especially common at Ranger River and at Cape Low. On September 2 one dived viciously at a dead Pomarine Jaeger, which I had just shot. All the young noted in the region of Cape Low were flying strongly. From September 4 to 9 the species was recorded daily.

On September 10 the weather at the Post was cold enough to freeze the water-barrel (30° F.), and there were several swirls of snow. At noon we noticed that the harbor in front of the Post was swarming with terns, thousands of them everywhere, both adults and young, the old ones busily diving for fish, the young ones begging for food or flying about quietly. This flock must have gathered for migration, for on the following day, when we had about an inch of snow, no birds were anywhere to be seen. I did, however, note several on September 11, and shot a male, which was rather fat. In the plumage of this specimen there was no evidence of moult. On September 12 another huge flock appeared in the harbor. The birds at this time were eating the crustacean known as the *kingook* or sea-louse. Their excrement had a decidedly pinkish color. Parents were seen constantly feeding their fully fledged young.

On September 14 a very few were seen at Coral Inlet. On September 16 and 17 a few were seen about the Post and on the latter date a very thin female was collected, as she was flying from the sea back to one of the larger lakes. This bird appeared to be whiter below than most individuals noted earlier in the season, and may have been just entering upon the post-nuptial moult.

On September 18 and 19 a few were noted at sea, as we made our way by motor-boat from Coral Inlet to Native Point and Leyson Point. None was seen anywhere after this date.

Spring Records: Bye and Bye (an Aivilik hunter) told me that he saw a few terns near Bear Island on June 7, 1930. On June 9 three were seen near the Post. By this time there was some open water about Bear Island and patches of water on the harbor ice near the Post, but South Bay was not by any means open yet, nor were the lakes thawed. On June 13 the first terns appeared along the lakes north of Coral Inlet, where they customarily nested. Here some of the largest lakes had thawed somewhat, though thick ice either covered the middle or clung to the bottom of all the bodies of fresh water. The twelve birds noted on this date were picking up from the water some sort of food, which I later determined was a kind of large water-beetle.† In crossing one of these lakes on the slippery, rotten ice, I found some of these beetles swimming slowly about in the pools, and put some in my pocket, but they must have crawled out, for I couldn't find them when I got to the Post. I collected a male tern on this date. The gonads were not much enlarged; and the stomach contained only remains of the black water-beetles above referred to.

On June 15 and 16 I noted that the birds were frequenting the islands, where they had nested the previous summer. South Bay, of course, was still frozen shut. They fed at the mouth of the river west of the Post, where in the blue black swirling water, which ran outward through a dirty ice-gorge, they dived for some sort of food, which appeared to be

†A Dytiscid, gen. and sp. (?). Most probably *Colymbetes seminiger* Lec., or *Colymbetes grønlændicus* Aubé.
Editor.

quite a distance below the surface. After feeding for a while they rested in great flocks on pieces of ice, which had lodged along the sides of the channel. On June 17 I collected a male which was quite fat.

On June 18 and 19 nests ready for eggs were found at Itiuachuk, at the head of the Bay, and at Prairie Point. The first eggs were gathered by one of the Eskimo boys at the Post on June 20. Most nests did not, however, hold eggs at this time.

On June 22 I found a small colony in an unusual situation, a kind of upland marsh on the gravel-plateau at Itiuachuk. A few Sabine's Gulls also were here nesting. The terns were nesting on small, grassy tussocks in the shallow water; but I did not find any eggs.

On June 23 I found several nests holding one egg on small islets near camp at Prairie Point. On June 24 Father Thibert found near the Post several nests with two eggs, and I shot a female specimen which had eggs the size of marbles in her ovaries. On June 25 a nest with two eggs was found at Prairie Point.

On June 27 I collected three males, one of which had decided incubation-patches in the plumage of the belly. We continued to find nests with eggs almost every day until mid-July. On July 2 some eggs, which were gathered for food, were found to be rather heavily incubated.

On July 6 I made a special trip to one of the colonies on a little islet in a large lake northwest of Seal Point. As I drew near the edge of the lake all seemed to be quiet; but once I started wading toward the islet all the terns rose and came toward me screaming loudly. The cold water was deep, and at one time I almost had to swim. When I was having the greatest difficulty in moving forward, the terns attacked me most savagely, flying at my head and pecking me fiercely with their beaks. At the island, which was almost round and perhaps fifty feet in diameter, I found forty nests, most of which held two eggs; six, however, held one egg, and one, three. The nests, which were well defined depressions in the turf, appeared to have been used for years. Most of them were near the outer edge of the island; but some were on the higher part in the middle. Other terns were nesting on islands nearby. Some of these nests were placed at least a hundred feet back from the water's edge, and were difficult to find, since there was little or no nesting material, and the eggs were very protectively colored. I found at least six nests, which appeared to me to have been made in old nests of the Old-squaw.

On July 7 I walked across the rapidly rotting salt-water ice of Duck Bay to the Tern Islands, several miles west of the Post. Here on the larger island, which was perhaps a quarter of a mile long, about two hundred pairs of Arctic Terns were nesting in the grass and flowering weeds, which thickly set the sandy crest. Mandt's Guillemots, Northern Eiders, and Old-squaws were also nesting on the island in considerable numbers. I located eighty-seven nests of terns in two hours. Forty of these held but one egg; forty-five held two eggs; and two held three. Since the Eskimos had already gathered many eggs from this island some of the original sets of three and two may have been replaced with smaller sets. The nests were very poorly constructed. Many of the eggs lay in mere depressions in the moss. Some of the nests were less than three feet apart from each other. I did not see any young birds on this visit.

On July 9 I collected three males and one female near Seal Point. All these birds had been incubating; on the crown of one of the males was considerable white spotting. The female seemed to have a shorter bill than the male; but her tail was equally long and slender.

On July 12 I visited a colony, where I found eighteen nests, each holding two eggs. On July 14 I found a small colony on a round, grassy island in a lake at the head of Coral Inlet,

where Pacific Loons and Old-squaws also were nesting. Here seven of the eight nests held two eggs, and one nest held one egg. In three of the nests the young were hatching. Nests found at Prairie Point on July 17 held only one or two eggs, and the young apparently were not hatching there. On July 30 newly hatched young were seen by Jack Ford at a small island at the head of South Bay.

I collected on August 2 one almost newly hatched young and another, perhaps three or four days old, on an island in a lake not far from the Post. Most of the eggs appeared to be at the point of hatching. While I was photographing one young bird, I happened to notice another, swimming away from the island. I gave chase, and the adult birds redoubled their attacks upon me, striking me again and again fiercely.

On August 3 Santiana shot a very interesting female specimen at Bear Island, which puzzled me for some time. This bird was obviously adult. The rectrices were of full length, and the mantle was of a solid pearl-gray color. But the top of the head had the coloration of a young bird and the bill and feet were practically *black*, with just a hint of red at the corners of the mouth, and at the heel and joints of the toes. I am now of the opinion that this was a bird in the so-called *portlandica* plumage, probably a year-old individual, which for some reason or other had carried through the nesting-season a plumage, which is characteristic of the winter months (see Bent, 1921, p. 245).

On August 4 Jack Ford, Constable Stewart from Chesterfield Inlet, and I took a motor-boat trip to several points in South Bay. First we went to Bear Island, where we found a good many terns, but saw no indication of nesting or of young birds. Later in the day we made an extended visit to the Tern Islands, where we saw dozens of downy young in two phases of plumage, and found numerous nests with two eggs, several with one egg and one with three eggs. The nests were situated in all manner of places. Some were neatly built of grass; other were mere depressions in the turf. Some eggs were laid on the rocks with absolutely no shelter; others were laid on the open gravel. During our stay we saw one young bird run to the water's edge and swim off. The adult birds flew down to it, crying loudly, dipping into the water, and actually lifting the little creature with their bills.

The two color-phases of the downy young interested me greatly. About seventy-five per cent of the birds were brown, the other twenty-five per cent grayish. The grayish birds seemed to me to have paler feet and bills than the brown ones.

Annual Routine: The Arctic Tern arrives from the south late in May or early in June at about the time the lakes begin to thaw. A few individuals usually arrive in advance of the great flocks. Mating apparently takes place after the nesting-grounds have been reached. Colonies nest on small islands in the lakes and also on suitable islands in the salt-water. Eggs usually are not laid at the inland colonies until the lakes have thawed. In the bays, however, nesting proceeds, even while the islands are completely surrounded with thick ice. Nests are usually mere depressions in the moss, sand, or gravel, and sometimes the eggs are laid on the bare rock. Often old nests of the Old-squaw are used. The eggs usually number two, but sets of one and three are sometimes found. Both sexes incubate. The period of incubation I found to be twenty or twenty-one days. The young birds are of two phases of color, a brown and a gray. During late summer young birds are to be found in all stages of development, owing to the egg-gathering customs of the Eskimos. The young continue to beg for food from their parents, long after they have learned to fly.

The post-nuptial moult is begun, but apparently not completed, while the adults are at the Island. Both young and old assemble in huge flocks, preparatory to undertaking migration.

The jaegers did not persecute the terns as much as I had expected. The Long-tailed and Pomarine Jaegers paid little attention to birds of any sort, and the Parasitic Jaegers were so intent upon chasing down longspurs and shore-birds, that they rarely pursued the terns. At Prairie Point, where there was a large colony of terns, and where the Parasitic Jaegers also nested in considerable numbers, I did not often see a jaeger chasing a tern, though to be sure the terns chased the jaegers whenever they had opportunity.

The Herring Gull doubtless eats the eggs and young of the Arctic Tern, when opportunity offers, for the terns always drive the big *Nowyah* away, whenever they come near the colony. The smaller Sabine's Gull, however, never molests the terns.

One of the principal reasons the terns nest on islands is that they may thus escape the Arctic Fox. Mr. Ford told me that foxes swim well and do not hesitate to visit islands upon occasion. It is my belief, however, that, when lemmings are abundant, the foxes make no attempt to raid the colonies of terns, and the island habitat of the birds keeps the foxes from destroying eggs or young, which they would eat were they more easily accessible. The Eskimos, however, do not hesitate to visit the islands, and gather hundreds of eggs of terns every season.

Fleshy Parts: Sketches of newly hatched young (August 2) show the following coloration of fleshy parts: eyes, dark brown, with bluish pupils; eyelids neutral gray; bill, dull *bittersweet orange*,* slightly duller at the very edge of the tomia, and fading to dull brown at the tip; feet and legs slightly brighter *bittersweet orange*, the claws brownish or blackish. As the bird becomes older the bill and feet become less orange and more reddish, and also gradually less bright, as the first winter-plumage is assumed. The bill and feet of a juvenal taken on August 21 were "much paler than in the adults, and the bill was tipped with grayish dusky."⁴⁰

A sketch of an adult (July 16) shows the eyes to be very dark brown, the eyelids dark gray, and the bill and feet between *rose red* and *spectrum red*, apparently somewhat more *scarlet* on the legs and feet. A sketch of the interesting specimen in *portlandica* plumage (August 3) shows the following: eye very dark brown; eyelids dull gray; bill blackish, somewhat suffused at the base with dull *maroon*, brightest at the corner of the mouth; feet and legs also blackish, with suggestions of *Victoria lake* and *light jasper-red* respectively along the tarsus and edge of the inner toe.

Other Records: Parry (1824, Appendix) lists the "Tern or Sea Swallow (*Sterna Hirundo*)" among the birds of this region, probably confusing that species with *paradisæa*, the latter being the common bird of this area. Rae did not take a specimen at Repulse Bay, in 1846-47. Kumlien (1879, p. 101) noted "thousands of these birds" about Cumberland Sound, Baffin Island, on June 19 and 20, 1878, but did not record it at any other time. Preble (1902, p. 81) says: "When I started south from near Cape Eskimo, August 13, the species had apparently commenced to migrate, and old and young were common on the Bay until we reached York Factory on August 26."

The species was noted as abundant on Low's expedition through the Arctic Archipelago. Eifrig (1905, p. 236) says: "This was the most common tern seen from the northern parts of Hudson Bay to the far north." Low (1906, p. 316) says: "Very common along both sides of Roe's Welcome. Breeds on the islands along the west coast and on islands in the ponds of Southampton Island. Common in Roe's Welcome, about Whale Point and northward." Specimens were taken at Cape Fullerton and at Southampton.

*Italicized words from Ridgway's *Color Standards and Nomenclature*.

⁴⁰Quotation from field note-book.

Mathiassen (1931, p. 28) lists "tern, (*S[t]erna macrura*)" among the species noted at Kûk during the last week of August, 1922. Mr. Ford found it abundant though local at Coats Island. Soper (1928, p. 85) gives us several records from Baffin Island. Strangely enough, Mr. Swaffield did not take a specimen at Mansel Island, where it almost certainly nests. We saw it in great numbers in the region of Chesterfield Inlet during the late summer of 1930, but did not record it farther south along the Bay, north of Churchill (Sutton, 1931c, p. 159).

Family ALCIDÆ.

Genus URIA Brisson.

47. *Uria lomvia lomvia* (Linnæus). BRÜNNICH'S MURRE.

Eskimo Name: Both Aivilikmiut and Okomiut called this species the *Akpa* (*Aukpa*, according to Soper, 1928, p. 79). This word, which is apparently in wide use among the Eskimo tribes, probably is an imitation of one of the bird's cries. Hantzsch (1928, p. 90) tells us that the natives of Ungava Bay call the bird *Akpa* and that the large Akpatok Island has been so named because of the huge *Akpa* colony, which inhabits it. Mr. Brandt tells me that the murrelets of Alaska⁴¹ are called *Ahl-pack*.

Status: The Brünnich's Murre does not nest anywhere on Southampton Island, though some of the cliffs at Seahorse Point and along the steep shores of Fox Channel appear to be admirably suited to the needs of a colony. It is, however, to be seen in the waters about the Island at any time of the year, and according to the Eskimos is one of the few species, which may be found at the floe throughout the dead of winter. Mr. Ford told me of a large colony of *Tinkers*⁴² on the cliffs at Cape Préfontaine, Coats Island. Doubtless most of the birds, which are to be seen in Fisher Strait and perhaps even in Sir Thomas Roe's Welcome, have wandered from the Coats Island colony. In South Bay the Brünnich's Murre is seen most frequently during mid-summer. At this season it is sometimes fairly abundant, though it always keeps well out from the shore.

Fall Records: Certain of the Eskimos said they saw *Akpa* near Native Point in late September and October, 1929. We did not, however, see any during our Cape Low and Seahorse Point sub-expeditions.

Winter Records: On January 18, 1930, Muckik reported that he had been seeing *Akpa* in considerable numbers at Seahorse Point during the preceding two weeks. On January 28 Amaulik reported that the Eskimos along the west coast of the Island had been seeing *Akpa* near Cape Kendall, wherever there was open water in the Welcome. On January 29 Jack Ford reported having seen many at the floe at Native Point. On February 6 and March 2 Muckik reported many from Leyson Point, Seahorse Point, and Native Point.

On March 4 one of the Okomiut walrus-hunters shot a specimen for me at the floe near Cape Low, about eight miles out from the land, but it was devoured by the dogs. From March 21 to 30 Muckik and Kooshooak saw many at Seahorse Point. Muckik told me the birds were living upon *kingook*, a crustacean commonly called the sea-louse.

Spring Records: With the advance of spring and the consequent breaking off of the edge of the ice along the Fisher Strait floe the Brünnich's Murres disappeared in large measure from the Southampton side of the floe. Probably the birds return at this season to their nesting-grounds on Coats Island. On May 12 at the floe about ten miles south of Bear Island I

⁴¹ Probably chiefly the California Murre, *Uria aalge californica* (Bryant).

⁴² The word *Tinker* is usually, I believe, applied to the Razor-billed Auk, *Alca torda* Linnaeus, of the Atlantic coast.

saw one flying among the moving ice at a considerable distance from the "shore"⁴³ where I stood. It was with a small band of Mandt's Guillemots. On May 15 I saw one swimming and diving close to the edge of the ice in company with four guillemots. On May 25 Koo-shooak saw one near Native Point. On the night of May 26 Amaulik Audlanat, with whom I was hunting, heard several calling not far from our tent at the edge of the floe. In the morning about two miles from our "camp" I collected a female in full breeding-plumage. In picking this bird up from the water I had to creep out to the very edge of the ice. A narrow thin section of the crust gave way, and I narrowly escaped a disagreeable ducking. The ovaries in the specimen were well developed, but there was no sign of an incubating patch on the belly.

On June 19 and 20 Kooshooak saw several small flocks near Native Point. By this time the solid ice had broken up considerably, so that the floe was but a mile or so offshore. The Eskimos expressed the belief that these birds were not mated. They did not notice any courtship demonstrations of any sort.

On July 14 Jack Ford and Santiana saw several small flocks and single birds near Bear Island. On July 19 Mr. Ford saw three in South Bay, about six miles southwest of the Post.

On July 23 Jack Ford secured three specimens, a male and two females, from fair-sized flocks, which were seen near Bear Island. All these specimens were fat. The gonads were somewhat enlarged, but not as at the height of the breeding season. Among the plumage of the belly appeared to be incubation patches, but these were small, as if they had not been used much. The stomachs held remains of fish.

These birds, judging from the condition of their sexual organs, could hardly have been non-breeding individuals. Yet it seems scarcely possible that they had come from Cape Préfontaine (the only place on Coats Island where they are known to nest) merely to search for food in South Bay. The Eskimos told me that no *Akpa* had ever been known to nest at Walrus Island and no colonies were known to breed anywhere on Southampton; so the occurrence of these mid-summer birds in South Bay is rather a mystery.

On July 24 Amaulik Audlanat and other Eskimos saw many in the vicinity of Walrus Island, but they assured me that no *Akpa* had ever been known to nest there. All these birds according to their report were adults.

The Colony at Coats Island: Mr. Ford visited the nesting colony at Cape Préfontaine several times while he lived at Coats Island.

He told me that hundreds of birds laid their eggs on the ledges above the sea, in such numbers that the breasts of the incubating birds, as seen from a distance, made solid bands of white against the rock-face. Hawks, which I think must have been Duck Hawks, nested on the cliffs also, and preyed constantly upon the murre. During the time of migration White Gyrfalcons frequently lingered about the cliffs, killing the murre with ease. In eating their prey, they skinned them crudely after tearing the head to pieces. They found food so abundant about the cliffs, that they frequently did not eat more than the head and breast of their victims.

During late summer the water at the base of the cliffs was filled with murre, adults and young. As winter advanced, the ice packed in along the shore and the birds were forced out to the open channel; but whenever wind or mild weather opened up the water at the base of their home-cliffs, they came back without hesitation, being found thus, at any time of the year, whenever the water was open.

⁴³ The word *shore* is used here in quotation, because the shore referred to is not the land, but rather *ice*, solid enough upon which to travel or camp.

The Eskimos gathered quantities of eggs for food, and frequently shot the birds, but did not often snare them.

Annual Routine: As a rule, the nesting Brünnich's Murres of the Southampton-Coats Island region do not move much to the southward during the coldest months. Only when the winter is very severe, do they have to move to the south in finding open water, where food may be obtained. It is a matter of common knowledge among the Aivilikmiut that the channel between Coats and Southampton practically never freezes, even during years when Frozen Strait to the north is frozen shut.

I have no definite data as to the time of courtship and nesting in the Cape Préfontaine region; but I infer, from specimens collected, that eggs had been laid well before mid-July. Individuals, taken on September 6 and 16, 1929, by Mr. Swaffield at Mansel Island, appear not to have completed the post-nuptial moult, for the faded primaries are all present. This moult is probably performed very deliberately, since there is so little migratory movement in the species, and since even the capture of food necessitates so little flying. The pre-nuptial moult is completed before the end of May, judging from the specimen taken on May 27, 1929.

The principal enemies of this species are those which prey upon it at its nesting-grounds. Here Duck Hawks and White Gyrfalcons capture adults and young. The larger gulls, the Herring and Glaucous, the Arctic Fox, and the Northern Raven probably eat a good many eggs and occasionally young birds. The Eskimos believe that certain species of seals occasionally prey upon young and adult *Akpa*, but I can offer no evidence that such is the case.

Fleshy Parts: The feet of specimens taken were dull, deep brownish, almost black. The bills were black, save along the swollen base of the upper mandible, which was bluish gray. The lining of the mouth was dull yellow. The eyes, which were deep brown, had rather a flat cornea and irregular, not circular, pupils, which gave the birds a queer facial expression. The eyelids were dull blackish gray.

Other Records: Most of the early explorers mention the tremendous colony of "fowle," "sea-fowle" or "willicks" at Cape Wolstenholme and along the north shore of the Digges Islands. There can be no doubt that most of these references apply to the Brünnich's Murre. A specimen from Hudson Bay, received through the Hudson's Bay Company, is recorded in the British Museum Catalogue of Birds. Swainson and Richardson (1831, p. 477) state that the species frequents Hudson Bay. Kumlien (1879, p. 105) found it common from Grinnell Bay north to the entrance of Cumberland Sound, Baffin Island. Preble (1902, p. 77) did not record it in the vicinity of Cape Eskimo, however. Elfriig (1905, p. 235) mentions three specimens taken by Low's party at Wolstenholme on July 21, 1904. According to this author "all through Hudson Strait they were numerous, often flying about the ship." Low (1906, p. 315) says: "Breeds in great numbers at Cape Wolstenholme, Digges Islands, and other places in Hudson Strait. Remains in the open water of Hudson Bay throughout the winter, numbers having been killed at that time at Fullerton." Bent (1919, p. 196) states that the breeding-range "presumably [includes] Hudson Bay," and gives the winter range as "from southern Greenland and Hudson Bay south to Maine." Mathiassen did not record it at Duke of York Bay in the fall of 1922. Soper (1928, pp. 79-80) gives us an account of its occurrence on Baffin Island, where it apparently is not very common. Mr. Swaffield took specimens on September 6 and 16, 1929, at Mansel Island (Sutton, 1932a, p. 42). We did not see it at Chesterfield or elsewhere along the west coast of Hudson Bay during the fall of 1930 (Sutton, 1931c, p. 160).

Genus ALLE Link.

48. *Alle alle* (Linnæus). DOVEKIE.

Eskimo Name: I wrote the name of the Dovekie as I heard it *Akpaliatsuk*. Hantzsch (1928, p. 92) spells this name *Akpaliarsuk*, and Soper (1928, p. 80) *Aukpilleauktuk*. *Akpa*, the first part of these words, is the name for the Brünnich's Murre; and *atsuk* is a familiar diminutive suffix.

Status: A rare and irregular winter resident, found in the open water usually near the edge of the floe to the south of the Island, particularly near Seahorse and Native Points. Its winter status in Fox Channel we do not know. It is noted also during the season of migration, especially along the eastern and southern sides of the Island.

Records: On September 27, 1929, we saw and collected a female in winter-plumage just to the south of Kikkuktowyak Island. This bird was not at all fat and the stomach was empty. As it sat in the water its head was drawn into the back and the bill and tail were noticeably turned up. The natives at first identified it as a *Pitseolak* (Mandt's Guillemot), but changed their minds when the bird, after being shot, turned over in the water.

On January 18, 1930, and on several dates thereabouts, the Eskimos Muckik and Kooshooak noted one or two in the open water near Seahorse Point and found at the base of a sheltered cliff the remains of one, which presumably had been killed by a White Gyrfalcon.

On January 24 Jack Ford saw one flying northward at Prairie Point. The bird appeared to be lost in the mist; it turned now this way, now that, in the sharp wind, apparently undecided as to which course it should follow.

On February 20 Kooshooak saw one at the floe near Native Point; and on March 2 Muckik saw one at the same place. On March 4 one of the Okomiut natives secured one for me at Cape Low, our most westerly record, but this specimen was eaten by the dogs. On March 19 Muckik saw two at one time near Seahorse Point, flying between open pools in the rough saline ice.

On May 25 two were seen together at the Native Point floe by the Eskimo boy, Joshua, and by some of the other natives. We did not see a Dovekie on any of our trips to the floe.

On June 19 and 20 several were seen near Native Point by many of the natives, and Kooshooak shot one for me with his big rifle. This specimen proved to be a female in breeding plumage. It was rather fat and the ovaries were slightly enlarged. In the stomach were the remains of some crustaceans, probably sea-lice. The bird had been so torn up by the bullet that it was with some difficulty that I saved it at all.

Other Records: During latter January of 1928 the Eskimos brought to the Post a Dovekie, which they had found dead, and in a very emaciated condition, at some distance inland from the open water of the floe. It was supposed by Mr. Alfred Copland, who examined this specimen, and who described it to me, that it had lost its way and flown inland, trying to find water in which to rest. Mr. Ford also remembered having seen a Dovekie thus flying over the salt-water ice, headed away from the open water.

Rae apparently did not take a specimen of this species at Repulse Bay. Kumlien (1879, p. 104) did not see it at Cumberland Sound, but found it "common" at Frobisher Bay, Baffin Island. Preble (1902, p. 78) says that "this species is recorded as abundant in Baffin Bay, Davis Strait, and other parts of the Arctic Seas, and it winters southward on the coast, hence it probably stays, at least in migration, about the northern part of Hudson Bay."

Eifrig (1905, p. 235) mentions no records from Hudson Bay. Low (1906, p. 315) says:

"Not common in Hudson Bay or Strait. Found there in the winter, but rarely seen in the summer."

Mr. Ford remembered seeing it rarely in the region of Cape Préfontaine, Coats Island. Mathiassen did not see it in 1922. Soper (1928, p. 80) says: "A few . . . were noted on September 23, near Hudson Strait." Mr. Swaffield did not take a specimen at Mansel Island. We did not see it along the west coast of Hudson Bay during the fall of 1930.

Genus *CEPPHUS* Pallas.

49. *Cephus grylle mandti* (Mandt). MANDT'S GUILLEMOT.

Eskimo Name: Both Aivilikmiut and Okomiut called the little Sea Pigeon the *Pit-seolak*, *Pitsiulak* (Hantzsch, 1928, p. 89), or *Pitshulak* (Soper, 1928, p. 78), a word which is in wide use among the Eskimo tribes everywhere. Amaulik Audlanat told me that this word is an imitation of the shrill, whistled cry of the bird; translated it means something like *he says*, or *it says 'pitsee.'* Mr. Brandt tells me that the Alaskan Eskimos called the Pigeon Guillemot, *Cephus columba* Pallas, the *Chee-o-wuk*.

Status: A locally common, even abundant, summer resident, which remains throughout the winter in the open water of Fox Channel, Sir Thomas Roe's Welcome, and Fisher Strait. At Walrus Island, where it is found the year round, it is the commonest of the nesting birds. Its occurrence in summer definitely depends upon properly boulder-covered or rocky islands, upon which it may nest. I did not find it breeding anywhere upon the promontories or seaside cliffs of Southampton proper; but at Tern Islands in South Bay it was fairly common; at Kikkuktoyak Island it was reported abundant by the natives; and it was known to have been common formerly, at Bear Island. It should nest on the small islands near Seahorse Point and in Duke of York Bay.

In keeping in the open water in mid-winter it doubtless migrates to some extent, but since this open water is usually near at hand the birds do not have to move about much. It is likely that the flocks of local summer resident birds are augmented somewhat in winter by individuals, which move south from more northern latitudes, or from bodies of water which have frozen shut.

Fall Records: On our trip to Cape Low during the fall of 1929, we saw Mandt's Guillemots several times. On August 27 two adult birds were seen about six miles from shore in the vicinity of Four Rivers. Both could fly; and both appeared to be in full summer-plumage. On the following day, eight adult birds were seen at sea near Hut Point. On September 9 a few adults and several whitish young were observed near Munnimunek Point.

On September 18 between Bear Island and Native Point, and especially in the deepest part of the body of water just north of Native Point, we saw many *Pit-seolak*, about twenty adults and perhaps forty young birds. Of the twenty adults seen, four flew up and away upon being approached by the motor-boat. The others dived, lifting their wings as they did so. An adult male and young female were collected. The former was in perfect black body-plumage, which had apparently not yet started to moult; but the primaries and secondaries of the nuptial plumage had all dropped out and the new quills were just beginning to appear. The greater wing-coverts, which had not yet dropped out, were considerably worn; they were slightly tipped with dull brown. The bird was quite fat, the stomach being filled with remains of some sort of crustacean, together with about twenty feathers probably from the bird's own body. The young bird, while not so fat as the adult, was in perfect plumage. It is my belief that most of the black-plumaged birds noted on this date were flightless.

On September 19 and 20 a few were seen in the region of Kikkuktowyak and at the mouth of the Anderson River. All but one of these were young birds, which could fly perfectly; the other was a moulting adult. On the following day several were seen near Leyson Point and a young female, which was very fat, was secured.

On September 24 one was seen just off the Semples Islands. On September 27 an immature male was taken not far from Kikkuktowyak Island. On September 28 four young males were collected in South Bay not far from the Post. These had probably been hatched on the larger of the Tern Islands. All were fat. One of the four was much whiter than the other birds, but I think this was due chiefly to individual variation.

Not once during the fall of 1929 did I see a guillemot on, or even near, land. Moulting birds were always encountered at some distance, six to fifteen miles, from the nearest land, and usually in deep water.

Winter Records: During January, 1930, Muckik, Kooshoak, and other hunters told me that *Pitseolak amishooluuet* (a great many *Pitseolak*) were seen in the region of Seahorse Point, wherever there was open water; but that toward the end of the month the ice packed in so solidly that the birds had to move out about ten miles from the land. On January 27 Amaulik reported that during the preceding three weeks many had been seen in the region of Cape Kendall in the open waters of Sir Thomas Roe's Welcome.

On January 29 Jack Ford saw 'many' at the floe near Native Point. He reported that the Eskimos had not been killing many for food, chiefly because seals were plentiful. On February 6 Muckik noted 'a great many' at Leyson Point. On February 8 one of the Okomiut Eskimos from Munnimunek Point brought me a very white male specimen, which, judging from the paleness of the mouth-lining and the dullness of the feet, I took to be a sub-adult. The specimen was exceedingly thin, and there was nothing in the stomach. The wings had been broken in observance of a tribal custom.⁴⁴ The Eskimos told me that the recent gale from the north had blown the loose ice so far out to sea that the *Pitseolak* were coming in to shore in great numbers.

On February 24 Angoti-Marik, who had just returned from Cape Low, reported that guillemots were abundant along the edge of the floe in all that region. On March 2 Kooshoak killed seventeen birds with two discharges of his shot-gun at the floe near Native Point. Fifteen of these birds, eleven males and four females, were brought in for me to skin out. I tried to save them all, though the *komatik*-trip had been rough on them, and most of them had broken bills. All had been frozen solid, of course, and at least four had had their heads broken completely off. All were fat, and all were in very white plumage. The stomachs were well filled with the remains of *kingook*.⁴⁵ This crustacean has such a pink color that the entire digestive tracts of the birds, the corners of the mouths, and the region of the vents were stained a pale salmon-color, which was very difficult to remove. I learned from Kooshoak that the birds were exceedingly abundant at Native Point. They swarmed about the open pools among the loose floe-ice, being so numerous as almost to cover the surface of the water. When the sun shone, many of the birds climbed out on the ice, basking on their bellies.

Among the series procured on March 2 certain birds with unusually bright red feet and with clear white patches in the wings were apparently older individuals than the others.

On March 16 Kyakjuak reported that nearly all the *Pitseolak* had left the region

⁴⁴ It is believed among many Eskimo tribes that mutilation of birds killed will insure good health and strong bones for the hunter in his old age.

⁴⁵ The "*kingook*" is commonly called the 'sea-louse' by the northern seamen.

of Cape Low. He thought they had moved northward into the Welcome. On March 21, however, Muckik reported that they were abundant as usual about Seahorse Point, where many had been killed as food.

Spring Records: On April 16 Amaulik saw what he thought to be mated birds at the *sheenah** near Native Point. He saw only a few birds in all, and most of them were swimming about at the edge of the ice.

On April 26 I had my first opportunity to observe the birds first hand at the floe. Pairs or single birds were seen here and there along the edge of the ice. When undisturbed they floated buoyantly on the water, twirling about as they dipped their bills in an animated fashion, as if at the point of diving. As they twinkled by in flight, two by two, or in groups of three or four, they sometimes uttered their shrill, whistling cries. Among the twenty-three birds seen on this date, two were predominantly gray, as in juvenal specimens taken in mid-fall; but with strikingly white foreheads, as if some other plumage were just leaving or coming in. At first I thought these birds were adults losing their winter plumage and taking on the black of the breeding season, but with the glass I could see that their plumage was not blotched, as in adults in the pre-nuptial moult, but edged or tipped with gray, as in young birds. Unfortunately none of these unusual specimens was taken.⁴⁷

Frequently while I was watching for a seal at the edge of the ice, a guillemot would suddenly pop up from the water almost at my feet, as if it had materialized on the spot. I found that the birds fed along the edge of the ice, diving at one place and moving along under the water, evidently feeding near the submerged ice, to come up some distance further along. This sort of systematic feeding was especially done while the tide was going out, at which time the current doubtless carried the birds along to a certain extent.

On April 30 two females in almost complete winter-plumage were taken at the floe south of Bear Island. One of these had a sprinkling of black feathers on the neck and underparts. Another bird, seen but not collected, and accompanied by two white birds, appeared to be in full summer-dress. The ovaries of the two females collected were not enlarged.

On May 7 four females were shot by Kooshooak at the Bear Island floe. By the time I got to camp, these birds had all been partly eaten by the Eskimos, who, being hungry, had cut long slabs of meat from the breasts. All these birds appeared to be in full winter plumage. On being skinned, however, they were found to be in the midst of the moult, the black pin-feathers coming through in all parts of the body, especially on the neck. The ovaries were only slightly, if at all, enlarged. On the following day, thirty were seen at the floe. Of these three were almost solid black in body-color. On May 12 a handsomely parti-colored female (ovaries unenlarged) was taken. On May 15 two almost solidly black females (ovaries unenlarged) were taken; and of the nearly forty birds observed, four were black. The stomachs of specimens taken at this time contained some particles of white molluscan shells in addition to the pink *kingook* remains. From May 25 to 29 not many guillemots were seen at the Native Point floe, and of these only one individual was in summer plumage. From the above it may be seen that the spring (pre-nuptial) moult is performed very irregularly in this species. Whether the more mature birds moult earlier, or whether the individuals which moult earlier are birds which locally nest, are problems which remain to be solved.

On June 24 I shot a female bird in full plumage and with somewhat enlarged ovaries at the mouth of the small river west of the Post. This specimen was not fat. The stomach

⁴⁶ The *sheenah* is the edge of the ice, or the floe. *Sheenah*, literally translated, means simply, *the edge*.

⁴⁷ There is a possibility, of course, that the birds were albinotic.

was empty. The nearest open water near the floe at this time was probably twelve miles away. Evidently the bird had come in, seeking its summer nesting-grounds, only to find them covered with snow and ice.⁴⁸

On July 7 I made rather a difficult trip afoot from the Post across the rough and somewhat rotten ice to the Tern Islands. Here in one of the big 'leads,' which had opened as a result of tidal action and the thawing of the ice, I counted twelve handsome guillemots, all mated, and swimming about in the water or standing upright at the edge of the ice. I shot two males, one with incubating patches on the belly. Both these specimens were fat, and the gonads were much enlarged. I spent a good deal of time walking about the islands, especially along the boulder-strewn margins, but I did not flush a single *Pitseolak*, nor find an egg. On July 11, however, an Okomiut lad, Munnam, found a set of two fresh eggs at this place.

On July 17 at the Tern Islands I secured a female, the ovaries of which were not much enlarged, and the white wing-patches were considerably spotted with dusky. I think this must have been a young bird in its first nuptial plumage. It appeared not to be mated.

On July 23 Jack Ford saw many in the waters about Bear Island. On July 24 Amaulik and his companions saw "hundreds" of nesting birds at Walrus Island, but they did not take time to collect any eggs.

On August 4 Jack Ford and I made our last visit to the Tern Islands and had an opportunity to observe the guillemots at the height of their nesting-season. We counted at least twenty pairs, which flew about the rocky shore, sat upon the rocks craning their necks at us, twirled and dipped in the water, or flashed from under the boulders where they were nesting. We found nine sets of eggs, seven with two eggs, one with one, and one with three. This last "set" may have been laid by two birds, since I noted that one egg lay perhaps three inches to one side of the other two. The "set" of three were fresh; the other sets collected were almost at the point of hatching. I collected also a breeding female, which had dusky-spotted wing-patches.

The birds had laid their eggs under the medium-sized boulders, which were scattered about on the larger of these islands. The eggs were not often difficult to reach and usually they could be seen easily. The lateness of the date was partly due to the egg-gathering of the Eskimos earlier in the season. By this time the ice had disappeared from all of South Bay, so that the Eskimos could not reach the little islets without a boat. Young birds were first reported on August 10.

Annual Routine: The autumnal freezing of the bays and coves forces the Mandt's Guillemots away from their nesting-grounds, save at such places as Walrus Island, where the surrounding waters often remain open the year round. During the winter, they rest and feed wherever they find an open channel. As early as April⁴⁹ evidences of the pre-nuptial moult may be noted, though the black body-plumage of the full adults is not usually seen before mid-May, and mating probably does not take place until after the moult is completed. Fully mature birds probably moult and therefore mate earlier than the young.

As soon as the ice breaks up round the islets, the birds make their way to the pools of open water where they linger, until the complete insularity of their nesting-grounds has been established; then they lay their eggs. Both sexes incubate. Sets of eggs usually number two, but sets of three are sometimes found. After hatching the young make their way to the water,

⁴⁸ The Tern Islands.

⁴⁹ Bent (1919, p. 164) says that the prenuptial moult "which is nearly complete, involving everything but the wings, . . . begins in March."

as soon as they are able to shuffle about,⁵⁰ and once they have gone to sea they do not again return to land, until the following year. They spend their first months in the deep waters, where their parents are undergoing the flightless period of the complete post-nuptial moult.

The principal enemy of the guillemot is the Eskimo, who gathers the eggs in summer, and kills the birds in winter. I did not see any species of gull or jaeger pursuing or annoying a guillemot in any way. The Eskimos told me they frequently had found remains of *Pitceolak* along the cliffs at Seahorse Point in winter. Here the White Gyr Falcon and Snowy Owl doubtless prey on the birds to some extent, especially when other food is scarce.

Fleshy Parts: I did not see or collect any downy young. The young birds in first winter-plumage have brownish feet, brownish bills, and the lining of their mouths is rather a pale salmon-color. The eyes of both young and adults are dark brown. The bill of the adult is black, both in summer and winter; and the feet and mouth-lining are of a startling shade of red, somewhat duller perhaps in winter than at the height of the breeding season. The soles of the feet, especially along the toes, are somewhat dusky. The toe-nails are black.

Other Records: Two specimens from Melville Peninsula are recorded in the British Museum Catalogue of Birds. The exact source of these specimens is not known. It is surprising that Rae (1850) did not take a specimen at Repulse Bay. Kumlien (1879, p. 104) found it common at Cumberland Sound, Baffin Island. Preble (1902, p. 77) saw two about fifty miles south of Cape Eskimo on August 3. Eifrig (1905, p. 235) says: "Eight skins, 6 in adult summer-plumage, 2 immature, taken July 16 and 17, 1904, at Cape Fullerton, where they are common summer and winter, as also throughout Hudson Bay and northward. . . Although feeding on crustaceans and small fishes they are used as food by both Eskimos and white people. They nest in cavities under rocks and boulders, one, two, and very seldom three eggs being the full set. They nest late, none of the twelve eggs collected being taken before July 10. The ground-color of the eggs is greenish white to chalky white, with large and small spots and blotches of black, umber, and lilac, most numerous and largest at the larger end." Low (1906, p. 315) says: "Common everywhere in Hudson Bay and in smaller numbers northward. Breeds on islands under large broken rocks, usually talus, at the bottom of cliffs. Skins and eggs collected at Fullerton and obtained at Cape Chidley." Dr. Bishop tells me that Captain Comer sent him five guillemot eggs which were collected on Southampton, probably in 1904.

Bent (1919, p. 162) states that "Mr. Lucien M. Turner did not find it breeding in Hudson Strait and saw only occasional pairs or solitary individuals." In the *breeding range* he includes the "islands north of Hudson Bay." Under *winter range* he says (*Ibid.*, p. 166): "Many doubtless winter in Hudson Bay and James Bay . . ." Mathiassen probably found it in the Duke of York Bay region in the fall of 1922, but does not mention it in his account (1931, p. 28). Captains Comer and Murray told me they saw the species frequently both in summer and winter. Mr. Ford found it nesting locally on and about Coats Island. Mr. Swaffield found it at Mansel Island and took an adult in handsome winter-plumage on November 25 (Sutton, 1932a, p. 42). We did not see it at Chesterfield Inlet during the fall of 1930 (Sutton, 1931, p. 157).

⁵⁰ The Eskimos told me that they had found very small, downy young several miles from land, out in the deep water. At such a stage they cannot dive well, but they are comparatively safe from the gulls and jaegers, which do most of their hunting along the shore.

Order **STRIGIFORMES.**Family **STRIGIDÆ.**Genus **NYCTEA** Stephens.50. **Nyctea nyctea** (Linnaeus). SNOWY OWL.

(Plate XX, figs. 1-4)

Eskimo Name: Both Aivilikmiut and Okomiut called this well known bird the *Ookpik* or *Ookpikjuak*. Soper (1928, p. 108) gives this word as *Opigjuak*, and Hantzsch (1929, p. 32) as *Okpik*. The word *Ookpik*, at Southampton Island, also meant 'willow shrub' or 'willow bud,' and when applied to the owl was intended as a sort of nickname. The suffix *juak* means 'big.' Mr. Brandt tells me that in Alaska he heard the word *A-nee-puk* used for the species.

Status: The Snowy Owl occurs the year round at Southampton. It is not a sedentary resident, however, though its migration considerably varies in extent from year to year, depending apparently upon the food-supply. During the winter of 1929-30 many individuals were seen about South Bay, where the species had not been seen at all during the preceding summer. Whence these wandering birds came, is of course a matter of conjecture. They may have come from other parts of the Island; from Melville Peninsula to the north; or even from the *south*, since the purpose of the migration is not primarily to escape low temperatures, but to find sufficient food.

I was fortunate in being on Southampton during what has been called a "good mouse year." As a result of the abundance of these rodents the Snowy Owl was very common. Mr. Ford and the Eskimos agreed that they had never seen so many *Ookpikjuak* as we saw during the winter of 1929-30.

Fall Records: In 1929 no Snowy Owl was seen in the vicinity of the Post prior to the beginning of winter. We first encountered it at Cape Low, where on September 3 Amaulik Audlanat secured for me a young female, barely able to fly, about six miles inland from the Cape. He saw also the parent birds, which flew at him in anger, but did not actually strike him. This young bird was very dark in appearance; the first winter-plumage was just beginning to show through the down on the wings and shoulders. In the stomach were the remains of a lemming.

On October 6 the Okomiut living at Cape Low reported that Snowy Owls were abundant in that section and that they were feeding on lemmings and ptarmigan.

On October 18 Angoti-Marik reported seeing one in the vicinity of the big Salmon Pond, about thirty miles to the westward of the Post.

By the latter part of October there was a noticeable influx of Snowy Owls in the region of Coral Inlet. On October 26 Jack Ford and I saw a heavily barred bird perched on a prominent hill-top several miles west of the Post. I watched it with my binocular. It held its head high and its eyes very narrowly open; it was very wary and flew off, while we were at a great distance. We found at the place where it had been perched a good many tracks, some drops of blood, and much excrement. Another bird was seen nearby.

On October 30 Jack Ford and Keetlapik saw two at Prairie Point and secured one, an exceedingly fat female, whose stomach was empty. This bird weighed 5 lbs., 9 oz. Jack told me that, as they picked the specimen up, a great pellet of lemming fur and bones dropped from the mouth. Judging from a patch of dark downy feathers at the base of the scapulars, I took this bird to be in its first winter-plumage. It was not heavily barred.

On November 3 Amaulik Audlanat saw one at Native Point. On November 8 a female, considerably barred, was caught in a trap on a stone beacon across the cove from the Post. The stomach was empty. Weight: 5 lbs., 2 oz.

On November 13 three Okomiut hunters brought from Munnimunek Point a very large, darkly barred adult female, which they had caught in a trap, and which weighed 6 lbs., 8 oz. The stomach was empty. It was exceedingly fat, as were most other specimens examined during the fall and winter.

On November 16 Father Thibert saw one near one of the gravel-hills known among the natives as *Noovoodlik*.

Winter Records: On the trip which Amaulik Audlanat, Muckik, and I made to the region of East Bay during the latter part of November and early December, we saw signs of Snowy Owls here and there, but decided the birds must be very rare. We saw their tracks and droppings on mounds where they evidently had been watching for their prey.

On November 27 a very white, but young, male was brought in to the Post from Munnimunek Point. It was very fat. It weighed 4 lb., 8 oz. Jack Ford saw one circling over the Post on December 3.

During the winter I frequently found signs of Snowy Owls at my fox-traps. On January 14, 1930, I found a large pellet near one of the traps, and on January 20 saw widely spread foot-prints and wing-tip impressions in the snow at another. On January 22 Kooshoak found the remains of one, which had been caught in one of his traps at Leyson Point, but which had been eaten by the foxes.

On January 27 Amaulik Audlanat brought me two male specimens (stomachs empty), both very fat, from the Cape Kendall region, where *Ookpikjuak* were reported to be very numerous. One was quite white, the other considerably barred. They respectively weighed 4 lb. 6 oz., and 4 lb. 4 oz. On January 31 Amaulik found the remains of one, which had been eaten by foxes in one of his traps at the head of South Bay.

On February 8 Jack Ford witnessed a remarkable combat between a trapped fox and an owl. The great bird swooped and dashed at the unfortunate animal and tore its face open with its savage beak and claws. The fox was nearly dead, when Jack reached the spot. On the same date Shookalook brought in a male specimen from Cape Kendall.

During mid-February I saw signs of owls near my traps, and collected a good many pellets, all of which contained the remains of mice with no sign either of ptarmigan feathers, or fur and bones of Arctic hares. On the 20th I saw marks in the snow, which suggested that an owl had tried to pick up bait from about a fox-trap without alighting. The trap had not been sprung. Three pellets found on February 13 held the remains of six mice. A pellet found on the 20th held the remains of two lemmings.

On February 25 Tapatai caught one in a trap, but both feet had been torn off and he and his family ate the bird. On March 2 Muckik found the remains of a very white one in a trap. The dogs had eaten it. On March 4 a rather thin male, weighing 3 lb. 14 oz., was brought in from Munnimunek Point. The gonads were very slender, so I think the period of mating had not yet begun. On March 16 another specimen, a male, weighing 4 lb. 8 oz., was brought in from Munnimunek Point. The stomach was empty, and the gonads very small.

On March 22 at Leyson Point Muckik found in a trap the remains of one, which had been eaten by foxes. On April 10 Evaloo caught a male in a trap at Native Point.

On April 18 Kyakjuak brought in from Cape Kendall three specimens, which were very fat. Two of these were males, with empty stomachs and small gonads. The other was a

female with slightly enlarged ovaries. Snowy Owls were reported as very abundant all through the western part of the Island.

Spring Records: After mid-April specimens, which were examined, showed evidence of mating. On April 22 Avimutuk's son brought in a male from Munnimunek Point. The stomach was empty, but the gonads were considerably swollen.

On April 26 we saw one, majestically perched on a pinnacle of ice at the edge of the floe. It hooted in a hollow voice several times. This hooting was, I believe, a courtship cry, since no such sounds had been heard during the winter.

On May 6 two male specimens were brought in, one from Salmon Pond, one from Munnimunek Point. Both were fat, and both had much enlarged gonads.

On May 19 at Itiujak we saw one during a high wind, crouched on the ground in the shelter of a stone. Its head was drawn down into its shoulders. It was a very heavily barred individual.

On May 24 Keetlapik brought in a male, which had just eaten a lemming. The gonads were much enlarged.

From May 15 to June 20 in the vicinity of the Post I heard Snowy Owls hooting, especially in the morning on the brightest days. The deep booming notes floated across the rosy-white snow-plains from far and near, sometimes from dozens of birds at the same time. The notes had a decidedly ventriloquial quality, so that they seemed sometimes to come from high in air, or from the ground. The air fairly throbbed with the dull, thick sounds.

On May 25, a beautiful day, at about ten o'clock in the morning, I counted at least twenty booming birds (probably all males) in the region about the Post. So far-carrying were the cries that I could hear also the birds across the harbor, seven miles away. I walked across the ridges back of the Post trying to locate one of the hooting birds. Finally, I found one perched on the top of a boulder, on a low ridge. To see him the better I crawled through the snow. When I got down to hands and knees he began hooting. He lifted his head, swelled out his throat enormously, elevated his tail comically until it stuck almost straight up, and gave four long, low hoots, bowing violently each time he hooted. Then he dropped his tail, pranced awkwardly with toes widely spread, as if surveying his surroundings for some sign of his mate, and hooted again. Booming voices answered from the ridges far and near. All at once, he spread and lifted his great wings and flew off stiffly. When next I saw him he was perched on a hill-top a mile away.

I did not know whether this bird had a nest or not, but decided to follow him. Walking was not easy, since the bright sun was beginning to thaw the drifts, and the snow sank deeply at every step. After going a mile farther I heard an owl hooting close at hand. I looked up just in time to see wide, white wings lifted, as a bird coasted toward me on set wings, drifting along only about four feet from the ground. I felt at once that this owl's interest in me meant that I was near a nest. I climbed to the crest of the ridge.

Then the assault began. The owl came straight toward me from the adjacent ridge, until he was about thirty yards away. Here he abruptly turned and circled, hooting angrily. As he flew he sank forward heavily after every wing stroke, then righted himself with the downward beat of his wings, looking back oddly as he flew past, never taking his narrowed eyes from me. I looked all over the ridge crest, but found only tracks in the snow and a few loose feathers. Occasionally when I took my eyes from the circling bird he suddenly flew down at me and I could hear the rush of his great wings and the sullen snapping of his beak not far above my head. It was thrilling to look into his glaring golden eyes, but I found myself hoping that he would not strike me with his talons, which hung downward menacingly.

I walked along this ridge for half a mile and found no sign of a nest. Furthermore I noticed that the farther I went the less attention the bird seemed to pay to me; so I retraced my steps. The attack was immediately resumed. I turned off to one side to follow the top of one of the lesser ridges. Then the female, a noticeably larger and darker bird, appeared. She flew quietly ahead of me, fell in the snow, and began a series of the most comical antics I ever saw. She lifted her wings, waddled around clumsily, lay down, got up and hobbled off, then lay on her belly with her wings spread on the snow all the while whining in a feeble voice. All this demonstration seemed hardly credible in so large a bird. She never swooped at me, though, while she dragged herself about on the ground, the male flew at me fiercely.

The hoots of the birds were very hoarse, and those of the male had a rasping quality which called to my mind the cry of a night-hawk, *Chordeiles minor minor* (Forster). The hoots were varied with snaps of the mandibles as well as with peculiar clicking cries and deep-throated grunts, savage in tone. I walked back and forth again and again, but could not find the nest. I retired and waited for a time hoping the female would return to her eggs, but she only stood on a rock watching me the whole time. When I took up the search again I walked to the end of the farthest of the low spurs which led out from the main ridge, and there, on the very top of the knoll, in a sort of basin in the six-inch deep snow, actually lying in almost an inch of chill water, were six eggs. The instant I found the nest the male fell to the ground, joined the female in flopping about with waving wings, and delivered an amazing series of laughing barks, which startled me considerably. Then he flew toward me and almost struck my head. As I photographed the nest the birds made cries which sounded like heavy teeth grinding together.

There was but little lining in the nest. During a recent gale much snow had fallen and this had evidently drifted about the sitting female, so that the eggs were surrounded with a distinct rim of snow. The nest was not sheltered by any sort of rock or shrub. The eggs, which were decidedly soiled, proved to be nearly fresh, and were very palatable.

During the last week of May I observed male owls hooting nearly every day. This hooting was apparently the equivalent of the singing of smaller birds, since the owls appeared to take much interest in making the performance as loud as possible.

On May 30 one of the Okomiut hunters found a nest, which probably had been deserted, containing one frozen egg. On May 31 I saw three pairs in the high country to the east of the Post and found a nest containing three eggs on a bare-topped gravel-bank about three miles inland from the frozen harbor. The parents of these eggs were not very fierce. They spent most of their time, while I was in the vicinity, perching on the grassy crest of a knob not far from the nest. Judging from the droppings, pellets, and tracks in the snow all about this knob, I think the birds spent much of their time there. The nest was rather neatly lined with bits of moss and grass roots, and there were about two dozen feathers from the mother's belly and flanks lying in and about the depression, where the eggs lay. On the same date Noah found a nest, containing seven eggs, along the banks of a frozen stream west of the Post. At the side of this nest was the body of a lemming. These eggs were brought in for food; they were almost fresh; one of them was not symmetrical, having somewhat flattened sides.

During the first week of June we had a severe gale, which must have destroyed a good many owls' eggs. The nest I had discovered on May 31 was found to be deserted on June 6, and the five eggs were covered with a thick, icy crust. I was surprised that they were not frozen and cracked. On the same date I found another nest containing two eggs. This latter nest was neatly built in the grass at the end of a rocky rise between two frozen lakes.

Only one of the parent birds, the male, was seen. On June 8 in the evening there were three eggs in this new nest and both parents were seen.

On June 11 several owls were seen. One was chasing an Arctic Fox at the mouth of Ford's Brooks. I do not think this bird was trying to capture the fox; it is more likely that the fox had threatened to disturb the nest.

On June 13 there were six eggs in the nest found on June 6. This, it seems to me, is fair evidence that the Snowy Owl lays an egg every other day until the set is completed.⁵¹ Occasionally, according to the Eskimos, a set may be completed to all appearance, then after the lapse of two or three days another egg may be added. On this date the male, which was decidedly more in evidence than the female, struck at me fiercely while hooting loudly and angrily.

On June 15 four eggs, an incomplete set, were brought in from the region of Poorhouse Hill. These were eaten for food; they were fresh.

Nesting pairs were seen at Itiuchuk and Prairie Point on June 18 and 19. On June 22 on the barren uplands south of Itiuchuk I found two nesting pairs and noted that the smaller birds, though they had every opportunity to do so, did not scold or mob the owls when the great birds flew about. Was this because the small birds did not fear the owls, which rarely attempted to capture them, or was it because they were aware of their diurnal habits?

On June 25 I found a nest with nine eggs on a little knoll near Poorhouse Hill. Both parents hooted and barked viciously. The whole mound was strewn with feathers, which could be seen waving in the wind some distance away. Many pellets also lay about. The eggs appeared to have been incubated for some time.

On June 30 a nest containing eight eggs was found north of the Post along the banks of one of the rushing streams.

On July 2 Noah found a nest containing six small young, which had just hatched, about six miles inland from Seal Point. On this date I noticed that Lapland Longspurs and Snow Buntings were scolding at an owl.

On July 14 I collected from the nest found on June 6, one newly hatched young and another young, which appeared to be at least a day old. At the edge and in the foundation of the nest lay the remains of several lemmings, and the feathers of a young horned lark and a Semipalmated Sandpiper. The young owls were silent. They lay motionless in the nest, unable to stand; their eyes were not open, though the eyelids were perfectly formed.

On July 24 I visited this nest again and found all the young hatched and dead in the nest. To one side lay the dead female parent, the victim of one of the Eskimo boys. The male bird was nearby, hooting angrily. When I came up to the nest he swooped at me. To one side of the nest lay the body of a juvenal Snow Bunting, which had just been killed, and a lemming.

The plumage of the female was decidedly interesting, for it proved to me that Snowy Owls may occasionally become darker, or more heavily barred, as they grow older. I had always entertained the notion that these owls become whiter as they grow older. In this specimen, however, the new feathers, notably the tertials, were decidedly more heavily barred than those which were dropping out. This coloration is the more interesting because the incoming, darker plumage was to be worn in its freshest condition, in the winter, when the whitest possible color would presumably be the most protective.⁵²

⁵¹Murie (1929, p. 7) found that the Snowy Owls at Hooper Bay, Alaska, lay an egg every other day, as a rule.

⁵²The white coloration of the Snowy Owl is sometimes called "aggressive." Whether "aggressive" or "protective," it assists the owl in procuring food and in escaping its enemies.

On the same date, Father Fafard found a nest with four small young. He shot the male parent in "self defense," for the bird attacked him fiercely.

During latter July and early August I saw Snowy Owls nearly every day in the vicinity of the Post and noted that they were moulting their worn plumage everywhere on the tundra.

Annual Routine: When food is abundant, the Snowy Owl of Southampton Island probably does not migrate at all; but, when lemmings or other food-animals are scarce, they move into territory, which will furnish them an adequate food-supply during the winter and early spring. Once having found a suitable feeding-ground they often remain to nest during the following summer. In winter they live principally on mice, though they may occasionally kill ptarmigan, Arctic Hares, or a fox, which has been caught in a trap.

In mid-May they begin to nest. Whether they keep one mate for several seasons or for a lifetime is more than I can say. The courtship antics, in which the males hoot with lifted tails, are kept up well into June. Egg-laying begins during the latter half of May. When the set has been started, an egg is laid every other day. According to my experience from four to nine eggs comprise a set. The female alone incubates, while the male defends the nest, and feeds his mate. The period of incubation was found to be about thirty-seven or thirty-eight days. Judging from the irregularity with which the young hatch, incubation begins at the time the first egg is laid. As noted above, a nest containing two eggs was found on June 6. One of these had probably been laid on June 4. The first young in this nest hatched on July 13.

The small young are fed on mice and small birds, especially the young of shore-birds, longspurs, and buntings; and at this time of the year the owls probably destroy more small birds than at any other season.

The post-nuptial moult of the adults begins at about the time the first young hatch and slowly continues throughout the summer. The young, which are helpless at first, are downy white. They slowly become strong enough to stand, and, when they find themselves able to crawl about, they wander among the rocks and grass. The downy white stage of plumage is followed by a dark gray, very soft plumage, which gives the birds anything but a snowy appearance. This gray plumage is followed by the first winter-plumage which is usually very white. As the birds become older, the females often, if not always, become more heavily barred and consequently darker in appearance. With the coming of the fall and winter the family-groups break up, as the individuals seek good hunting-grounds, but the parents may remain together more or less throughout the winter.

The natural enemies of the Snowy Owl are chiefly the Arctic Fox, which steals eggs and young, whenever it can, and the Eskimos, who not only shoot *Ookpikjuak* for food, but who catch them in traps and gather their eggs in the early spring. About the Post the Husky dogs broke up several nests of Snowy Owls.

Fleshy Parts: The eyes of the newly hatched Snowy Owl are not open. When, usually less than a week later, they open narrowly, the irides are almost blue-white, or pale grayish-yellow in color. As the birds grow older, the eyes gradually become yellower. In the adult the irides are brilliant golden-yellow, at times almost orange. The bill and eyelids of the newly hatched young are decidedly bluish, palest on the horny part of the upper mandible; the feet are pinkish. Both bill and feet become darker and duller as the young grow. The cere of the adult bird is dull neutral gray; in the newly hatched young it is pale blue. The claws of the baby bird are almost white; these gradually darken until they are almost black in the adult.

Other Records: Nearly all the earlier travellers, who have anything to say about the

wild-life of this region, mention the Snowy Owl. Thus Henry Ellis (1749, p. 40) writing of the voyage of the *Dobb's Galley* and *California* includes an interesting paragraph on the "great *White Owl*, of a bright and shining colour." Parry (1824, p. 56) encountered it about Repulse Bay on August 21, 1821. Lyon (1825, p. 47) mentions it among the species he noted. Rae (1850, p. 92) says that on February 23, 1847, he "came upon a white owl feasting on a hare, which it had killed after a severe struggle, to judge by the marks on the snow." Kumlien (1879, p. 81) found it at Kingnait fiord and the Kekerten Islands, Baffin Island.

Preble (1902, p. 111) says: "the reports of various Arctic expeditions note its occurrence at several points to the north and northwest of Hudson Bay. Its presence throughout the region in winter is attested by various observers." Eifrig (1905, p. 240) says: "This species is said by the Eskimos, who are quite shrewd observers, to breed inland from Cape Fullerton." During Captain John Murray's residence on Southampton from 1902 to 1905 he secured several skins of the Snowy Owl, but did not finally preserve them. Low (1906, p. 318) says: "A few specimens were seen in the early spring about Fullerton. They are reported by the natives to breed inland. . ."

Mathiassen (1931, p. 28) recorded the "snowy owl (*Nyctea nivea*)" at Kûk during the last week of August, 1922, and tells us that he saw "while at Darkness Lake during the winter only one raven and one snowy owl." Mr. Ford saw the species repeatedly during his residence on Southampton, and found it nesting at Coats Island. Soper (1928, p. 108) gives us several interesting records from Baffin Island. Mr. Swaffield took several specimens (one in particular on November 4) during the winter of 1929-30 at Mansel Island, where it "probably nests" (Sutton, 1932a, p. 43). We did not see it at Chesterfield during the fall of 1930, but understood that it had been known to nest there (Sutton, 1931c).

Genus *SURNIA* Duméril.

Surnia ulula caparoch (Müller). AMERICAN HAWK OWL.

A specimen said to have been taken by Rae at Repulse Bay, in 1846-47, is recorded in the British Museum Catalogue of Birds. Since this is distinctly a woodland species, I think it likely that the specimen was taken to the southward of Repulse Bay, probably at the mouth of one of the rivers.

Genus *CRYPTOGLAUX* Richmond.

Cryptoglaux funerea richardsoni (Bonaparte). RICHARDSON'S OWL.

A specimen of this species, said to have been taken by Rae in 1846-47, at Repulse Bay, is recorded in the British Museum Catalogue of Birds. I think it hardly likely that such a forest-loving species was taken anywhere on the Barren Grounds. Preble (1902, p. 110) says "it probably occurs throughout the Hudson Bay region."

Order **PASSERIFORMES.**

Family **ALAUDIDÆ.**

Genus *OTOCORIS* Bonaparte.

Otocoris alpestris arcticola Oberholser. **PALLID HORNED LARK.**

None of the specimens of *Otocoris* which I collected at Southampton even approaches this form in the white coloration of the throat; but Soper took a specimen at Baffin Island, which is apparently referable to it. He says (1928, p. 109): "A male specimen taken at

Nettilling Lake, June 25, has a pure white, instead of well-marked yellow, throat and seems indistinguishable from *O. a. arcticola*." According to the Committee of the American Ornithologists' Union (1931, p. 212) the breeding range of *arcticola* is far to the westward of the present region, "from Alaska (except Pacific coast strip) and in the upper Yukon Valley, south on high mountains through British Columbia to Washington."

Judging from the large size and whiteness of this form, I should not be surprised to learn that it breeds across the continent and on the Arctic islands north of the other American races of *alpestris*. If this should prove to be the case, such a record as Soper's would not be especially remarkable, for it would represent merely a slight southward or southeastward summer extension of the range. So little collecting has been done in some of these northern regions, Boothia Felix, for example, that our knowledge of the distribution of such boreal forms as the present is of necessity very hazy.

51. *Otocoris alpestris hoyti* Bishop. HOYT'S HORNED LARK.

(Plate XIV, fig. 4)

Eskimo Name: *Kopernoakpah*, the same as that of the Northern Horned Lark (which see).

Status: Hoyt's Horned Lark is a common summer resident in the region of South Bay. It is not so common farther west, at Capes Low and Kendall, and I do not know whether it occurs at all in the extreme eastern, higher part, where its place may be altogether taken by *alpestris*. Unfortunately no summer collecting was carried on about East Bay and Seahorse Point, so I do not know which race breeds there. *Alpestris*, apparently, is the only form which occurs there as a migrant.

Hoyt's Horned Lark arrives in the spring a little later than the Snow Bunting and Lapland Longspur, and departs somewhat earlier and more definitely in the fall. It has never, to the best of my knowledge, been recorded in winter.

A series of seventeen specimens was taken, all but four of these during the breeding season. As is noted in our discussion of the race *alpestris*, all these birds have long, slender, sharply pointed bills, and very white faces, in comparison with the four specimens of *alpestris* taken in the eastern part of the Island, and with most of the thirty-six birds taken on Baffin Island by Mr. Soper. They are very similar, however, to a male specimen (Canadian National Museum Collection, No. 24426) taken by Mr. Taverner at Chesterfield on July 4, 1930.

The birds in Mr. Soper's Baffin Island series which approximate most closely the Southampton *hoyti* are admittedly similar in coloration, but their general appearance is different. The bills are not so slender, nor so sharply pointed, and the impression given is of a larger, more *alpestris*-like bird. Such a condition naturally would be the case, where the two forms come together and hybridize.

It is interesting that in the six examples of *Otocoris* in winter-plumage taken on Southampton Island during the fall of 1929, it is instantly possible to distinguish the four specimens of *O. a. hoyti* from the two representing *O. a. alpestris* by the bill alone,⁵³ and this may be done in looking at the birds from above, from below, or from the side.

⁵³Mr. Todd, who has been good enough to critically examine my Southampton horned larks is of the opinion that these "two *alpestris*" may be young *hoyti* with "stumpier" bills. With this opinion I am not quite prepared to agree, for all the immature horned larks taken in the western part of the Island, all of which I have referred to *hoyti*, were taken earlier in the season, and should therefore have bills just as "stumpy" as, if not "stumpier" than, birds taken later in the season. The four earlier, pointed-billed birds had not even completed the post-juvenile moult; the "two *alpestris*" were in complete winter-plumage.

Measurements in millimeters of *Otocoris a. hoyti* (breeding) from Southampton Island.

MALES					
G.M.S. No.	C. M. No.	WING	TAIL	CULMEN	TARSUS
3501	110,069	107.5	65	12.5	23
3512	110,080	113	72	13.5	23
3522	110,088	113.5	67	13	22.5
3523	110,089	112	68	14	22.5
3544	110,110	112	68	14	23
3545	110,111	111	68.5	14	23.5
3546	110,112	113	71	15	23
3560	110,126	111	68	13.5	23
3663	110,219	109	64.5	13	21.5
Average		111.2	68	13.6	22.7
FEMALES					
3647	110,113	100	57.5	11	22
3548	110,114	101.5	60	11.5	20.5
3561	110,127	102	58	11.5	21.5
3664	110,220	101.5	61.5	13	21.5
Average		101.2	59.2	11.7	21.3

A series of specimens,⁵⁴ supposedly representative of *hoyti*, and most of them in summer plumage, from Coronation Gulf; Bernard Harbor; Amundsen Gulf; Great Bear Lake; Churchill; Chesterfield; Tavane; Fort Simpson, Mackenzie; Edmonton (50 miles north), Alberta; and one or two from Baffin Island are all comparable to the Southampton birds in most respects. The Southampton birds, however, tend to be noticeably less darkly and heavily streaked on the back than birds from farther west, and their bills tend to be longer and slenderer in appearance. The fact that the Southampton birds appear to be whiter-faced may be due to the makeup of the skins. In the entire series there is a great deal of variation in the extent of the black of the head.

The type specimen of *hoyti*⁵⁵ is, of course, an individual taken during the period of migration, probably in the winter-range of the subspecies, in Towner County, North Dakota. This individual is probably not in full breeding-plumage, for the spring wear which accompanies the period of migration and courtship is sufficiently extensive to considerably change the appearance of such a bird as a horned lark. The actual breeding-range of *O. a. hoyti* is, therefore, somewhat problematical, though we may perhaps properly infer that it is somewhere more or less directly north of the winter-range.

Oberholser (1902, p. 812) gives the summer-range of *O. a. hoyti* as "British America from the west shore of Hudson Bay to the valley of the Mackenzie River, north to the Arctic coast, south to Lake Athabasca." He gives us also the average measurements in millimeters of fifteen male specimens, as follows: Wing, 111.1; Tail, 70.5; Culmen, 11.4; and Tarsus, 22.3. A comparison of these average measurements with ours shows the Southampton birds to be the same in size, but slightly longer-billed, and in a bird of the size of a horned lark, this difference may considerably affect the general appearance. Furthermore, the slenderness of the bill often shows more noticeably in the females than in the males.

Before seeing Mr. Soper's collection of *Otocoris* from Baffin Island, I believed *O. a. hoyti* to be the race characteristic of that section. Now, however, that I have compared his series with the Southampton birds, I feel sure that most of his birds are clearly closer to

⁵⁴Loaned by the Canadian National Museum, the Bureau of the Biological Survey of the United States Department of Agriculture, and the Carnegie Museum.

⁵⁵See Bishop, *Auk*, 13, April, 1896, p. 130.

the form *alpestris* than they are to *hoyti*, in spite of the fact that some of them have the coloration of the latter. If these birds from Baffin Island are not *O. a. alpestris*, they probably are in need of a name,⁵⁶ for they certainly are distinctly different from birds taken along the Arctic coast in what we suppose to be the breeding range of *O. alpestris hoyti*.

Fall Records: During my first few days of field-work at the head of South Bay, I did not see any horned larks and began to fear that the species was not indigenous to that part of Southampton. On August 20, however, while walking inland from the Post, I came upon a wary flock of five birds, a family-group I think, on the crest of one of the ridges. I could not get close enough for a shot.

On August 21 I observed a loose flock of about twenty birds on a plateau east of the mouth of the Koodlootok River. I collected four males from this flock and found them all to be adults, in the final stages of the post-nuptial moult. The flock was busily feeding among the moss and short grass. A few were seen on the following day in the same region. On August 30 a few were seen at Hut Point, and three were noted on August 31 a little to the west of that. On September 1 a flock of six flew over the mouth of the Ranger River. On September 3 three were seen at Cape Low. On September 4 and 7 small flocks were seen at Four Rivers. During mid-September a few were seen almost every day in the vicinity of the Post, always in the high country from two to six miles inland, and rarely along the coast. Small flocks were seen September 11-13. On the last-named date I noted that the birds were beginning to associate somewhat with the migrating flocks of Lapland Longspurs. On September 14 and 17 family-flocks were seen back of the Post and at Seal Point. On September 18 three were seen on the high gravel-mound just back of Native Point, where the Eskimos told me they were usually common. On September 19 several were seen in the vicinity of Lake Brook. On September 20 and 21 a few were seen near the mouth of the Anderson River. Unfortunately none of these were collected, and I am not certain whether they were *O. a. hoyti* or *O. a. alpestris*. Birds seen and collected at Seahorse Point on September 22 and 23 were all *O. a. alpestris*.

The last horned larks of the season (probably *alpestris*) were seen near the mouth of the Anderson River on September 25 and 26.

Spring Records: On May 19, 1930, a male *O. a. hoyti* was seen at the Post, feeding about the buildings with a flock of male Snow Buntings. This bird was watched and chased by every dog and child at the place.

On June 3 a very weak and much emaciated male was brought to me alive. The gonads were much enlarged. On the following day another male was seen in the vicinity of the Post. It came about the buildings, where it fed with the buntings. On June 6 a male was shot by Keetlapik at the mouth of the Koodlootok River. This bird also was exceedingly thin.

On June 7 not far inland from the Post I observed three separate males and collected two of them. Neither was fat and the gonads of both were much swollen. I heard no songs on this date. On June 8 and 9 several male birds were seen at the Post and at Prairie Point, but none was singing.

On June 10 the first females appeared, and the songs of the males, as if by some magic,

⁵⁶The author candidly feels that both the Baffin Island birds, which are obviously close to *alpestris*, of the Labrador coast, yet perhaps a little paler and a little larger; and the Southampton birds, which are close to *hoyti*, but perhaps a little smaller and longer-billed, might bear subspecific names in recognition of these differences; he feels, however, that if any names are to be given, they should be given by someone who has had opportunity to examine a large amount of material, including all the type specimens of recognized and unrecognized forms; and by someone to whom the naming of a new form is not an end and aim of ornithological research, but a means to an end.

suddenly began to be heard everywhere from the hill-tops and from high in air. On this date I secured three males and two females. The males were thin, the females very fat.

On June 11 I observed many pairs mating all over the hilly country about the head of South Bay. The males were chasing the females about, and lustily singing everywhere. The song, so far as I could see, was precisely like that of the Prairie Horned Lark, *Otocoris alpestris praticola* Henshaw. On this date I saw one female with a piece of grass in her bill. I did not see her go to her nest, for while I watched her, the male flew at her and chased her away. The belly of the female of a mated pair collected was not yet bare of feathers.

On June 16 Father Thibert found a nest containing one egg on a flat-topped ridge about two miles north of the Post. The female was not flushed from the nest, which was built into a deep cup in the ground without a particle of protection above or about it.

On June 24 I watched several males for some time, and, since I did not see any other birds, decided the females must be on the nests. On the following day, after watching a pair of birds for fully an hour, and tracing them over about a mile of country, I located a nest with four well incubated eggs.

When I first encountered these birds, they were quietly feeding along the side of a ridge, the female being a little more nervous than the male, and more energetic in her movements. Occasionally she acted as if she had finished with her feeding, but appeared not to feel safe in going to her nest while being watched; so she turned again to her feeding. She was much less confiding than the male. I kept my eyes constantly on both birds, which were never far apart, and eventually saw them fly off to the highest part of the ridge about a quarter of a mile away. For a moment or two I did not see either bird. Then the male, mounting slowly into the sky, began to sing. I felt sure the female had returned to her nest. I walked carefully back and forth over the entire crest of the ridge, and finally again spied the female, quietly walking about through the grass in front of me. She was plainly more agitated than before, but she did not utter any cry of alarm. Suddenly she ran to a nearby plant and unceremoniously tore a mouthful of down from its head, as if about to begin lining her nest. This mouthful she let drift away in the wind. Then she snatched another mouthful and ran about nervously as if waiting for a chance to go on with the construction of her nest. By this time I had withdrawn so far that she was not afraid to return to her eggs. She ran almost directly to them and quickly settled down.

The nest was beautifully made of grasses and the slender stalks of weeds, warmly and and thickly lined with silky vegetable down, some of which was from the plant we called 'bog cotton.' It was not situated on the very crest of the hill, as I had expected it to be, but about twenty feet down the southward slope from the crest, and was a little sheltered by a tuft of grass and by a large boulder about fifteen feet away. It was about sixty feet from the edge of a small shallow lake.

I spent considerable time in photographing this nest and in becoming acquainted with the parent birds. The male paid little attention to me; the female, however, never went more than a hundred feet away while I was there, and much of the time she ran about only twelve or fifteen feet from me. As she threaded her way through the grass she always acted as if she were looking for food, poking her bill here and there and sometimes scratching a little. She did not, however, gather any more nesting-material in her beak. When I sat down six feet away from the nest she promptly returned, and after a little anxious inspection settled on her eggs. If I moved a little closer she would run away in haste and not get on the nest again, though she would come up to it and hop across it, looking down

at the eggs. Whenever the female settled on her eggs, the male began to sing from high in air.

On June 30 I watched two female birds for some time, but they did not lead me to their nests.

On July 3 a nest containing five small young was found on a flat, almost grassless plain above a lake. I watched the male bird capture a large crane-fly, which he fed to the young. Both the male and female constantly searched for food, while I watched them.

On July 5 another nest containing five half-grown young was found near the head of a mossy ravine on a gentle slope. The female was on the nest. She permitted me almost to step over her before she flushed. The young were very dark in appearance. Even when I stood directly above them it was difficult to see them.

On July 7 Noah found a nest with four small young near the mouth of the Koodlootok River. On the following day on a long walk I noted about twenty pairs of horned larks, and from their behavior I think all had young in their nests.

On July 14 the remains of a fully fledged young, which must have been out of the nest and probably could fly, were found on the rim of the nest of a Snowy Owl, though no young horned larks were seen flying about.

On July 19 several young birds were seen on the wing with their parents, and in fact, wherever I went through their haunts I encountered family-groups feeding in the grass. There were usually five birds in a brood. On July 22 the young birds seen were as large as their parents and had wings and tail of full length, but their flight was a little less certain and their movements in walking more awkward.

During latter July and the first half of August I kept a close lookout for signs of the building of a second nest. Unless the spring season is unusually early, permitting the birds to get one brood well out of the nest by about the middle of July, I think they do not attempt to rear a second brood. Up to the time of my departure I continued to see adult birds going about with their fully fledged young.

Annual Routine: Hoyt's Horned Lark is never seen in winter at Southampton. It returns in the spring at about the same time as the other small birds, being a little less hardy and adventuresome than the Snow Bunting and Hornemann's Redpoll. It usually arrives at the same time as the Lapland Longspur. The males come well in advance of the females, and by the time they reach Southampton are usually thin. They do not sing at all until the females arrive. Under the circumstances it seems hardly likely that this bird ever mates for life.

During the period of courtship the males sing a great deal, both from high spots on the ground and from the air. The female alone builds the nest, and performs all the duties of incubation. While the male occasionally brings her food, there are regular periods of the day when she leaves the nest to preen, bathe, and feed.

The nest is usually built in the open quite a way from water, often on a sloping plain or plateau, and not often on the highest part of a ridge. It is placed in a cup-like depression in the tundra. It is made of the stalks of weeds, grasses, and small leaves, lined with soft vegetable material, especially the tassels of "bog cotton," and the plumose pappi of some of the flowering plants. I did not note any "pavements" near nests.

The eggs usually number four or five. The first egg was found on June 16. This nest held a probably full set of five fresh eggs on June 20. The first newly hatched young were found on July 3. The period of incubation therefore is probably about thirteen or fourteen days. The young are fed by both parents on insect-food, which is abundant at that season.

The fully fledged young go about with their parents during the rest of the season. Unless the spring is unusually early, but one brood of young is reared. The young at the time of leaving the nest are in a much spotted and very pretty juvenal plumage, which is completely moulted in late August, apparently at about the same time the adults perform the post-nuptial moult.

Hoyt's Horned Lark leaves Southampton for the south among the earlier fall migrants. It has entirely disappeared before the last of the Snow Buntings, redpolls, pipits, and Lapland Longspurs have gone.

Its principal enemies are the Parasitic Jaeger, which eats the eggs and captures both young and adults; the weasel, which searches the ground carefully for the nests of small birds; the Arctic Fox; the Snowy Owl, which chiefly captures the young birds at the time its own young have to be fed; and the Duck Hawk. The Herring Gull does not greatly disturb this species, for it hunts chiefly along the lake-shores and coast and not in the high country of the interior.

Other Records: *Otocoris alpestris* records from the Southampton region probably apply for the most part to *hoyti*. Richardson records a specimen of horned lark taken on July 10, 1822, near Cape Wilson, Melville Peninsula (1825, p. 343). J. C. Ross (1835, p. xxvi) took a specimen near Felix Harbor, Boothia. Bishop (1896, *Auk*, 13, p. 132) in his description of *hoyti*, includes a paragraph upon two male specimens "in worn breeding plumage . . . said to have been taken by George Comer, at Depot Island, Hudson Strait [Hudson Bay] in May, 1894."

Preble (1902, p. 114), under *hoyti*, says: "We first met with this form on the 'Barrens' about 50 miles north of York Factory, July 19, and found it common from there north as far as we went, especially at Fort Churchill, where adult birds and a young one not long from the nest were taken July 24 and 26. A specimen was collected 50 miles south of Cape Eskimo August 4."

Under '*Otocoris alpestris*. Shore Lark,' Eifrig (1905, p. 240) says: "Three male specimens were taken at Fullerton May 25 and 26, 1904. They were not common there; a few could be seen walking around among the Snowbirds." Low, contradicting Eifrig's statement in part, and under *hoyti* (1906, p. 318) says: "This species was common at Fullerton in June, feeding along with the Snowflake and Longspur on the garbage about the ship. A number were caught in traps. Skins and eggs from Fullerton."

Mr. Ford told me that he had seen horned larks ('Sky Larks' as he called them) commonly at Southampton and at Coats Island. Mathiassen did not record it in the Duke of York Bay region during the fall of 1922.

Soper (1928, pp. 108-109) gives us an extended discussion of *Otocoris alpestris hoyti* as he found it on Baffin Island. As suggested elsewhere in the present paper, it is our opinion that most of his remarks apply to the large, stubby-billed, yellow-faced, eastward-ranging, probably more maritime *alpestris*, for most of his birds are certainly decidedly closer to *alpestris* than to *hoyti*.

Mr. Swaffield did not take a specimen at Mansel Island during 1929-30. We saw it commonly at Chesterfield during the late summer and fall of 1930 (Sutton, 1931c, p. 159), and noted juvenal birds so late as to suggest the possibility of their rearing a second brood in that section.

The Committee of the American Ornithologists' Union (1931, p. 212) gives the breeding range of *hoyti* as "from the mouth of the Mackenzie to the west shore of Hudson Bay and south of northern Alberta and northern Manitoba."

52. *Otocoris alpestris alpestris* (Linnæus). NORTHERN HORNED LARK.

Eskimo Name: The only name I heard for the horned lark was *Kopernoakpah*, spelled *Koppernoakpak* by Hantzsch (1929, p. 33). This word is only a slightly lengthened form of the word *Kopernoak* which is often applied to the Snow Bunting. Soper (1928, p. 108) gives us the following names from Baffin Island: "*Tingodluktuk*; *Mannorodligak*, -gak, -kat, according to Hantzsch."

Status: Two forms of *Otocoris alpestris* occur on Southampton Island: a larger, yellow-faced form, similar to that found in southern Baffin Island; and a white-faced form, apparently similar to that found in the region of Chesterfield Inlet, and perhaps along most of the western coast of Hudson Bay. Whether both these forms occur throughout the summer in different parts of the Island is more than I can say. If the former race (the yellow-faced bird which we will for the present call *alpestris*) nests, it does so in the higher eastern and northeastern part, in country which we suppose is similar ecologically to that of southern Baffin Island.

My present feeling, however, is that the race *alpestris* is largely, or altogether, migratory on Southampton. I make this statement for two reasons: first, specimens of *alpestris* were taken only during the migration season; second, none of the series of thirteen breeding *Otocoris* collected even approximates *alpestris* either in coloration of the face, or in the shape and general appearance of the bill. The definitely fixed uniformity of the series of breeding birds from the head of South Bay appears to me to be really remarkable in view of the well-known tendency in this species to vary, intergrade, and hybridize.

In studying my Southampton series of horned larks, I borrowed a good deal of comparative material,⁵⁷ among this a handsome series collected by Mr. Soper on Baffin Island. Concerning these birds, Soper (1928, p. 109) has written: "The great majority are typical *O. a. hoyti*, are as large as *alpestris*, but have white eyebrows and much white on face and sides of neck. Five specimens from Nettilling Lake represent birds found associating with typical *O. a. hoyti*. These five, if not typical breeding *alpestris*, are much nearer to that race than to *hoyti*. Amongst the specimens are several which are intermediate between the two extremes."

I think Mr. Soper is wrong in calling "the great majority" of this series *hoyti*, or in referring to them as having white eyebrows and white faces. In looking at these birds in an off-hand way, their faces *do* appear to be rather pale; but when compared with the Southampton breeding birds, the decidedly *yellow* face and *heavy, stubbed bill* show up immediately; and furthermore, when compared with a series of seven breeding birds from the Labrador coast (supposedly *alpestris*) they do not appear to be in any way *greatly* dissimilar from them.

Measurements in millimeters of *Otocoris a. alpestris* from Southampton Island.

MALES					
G.M.S. No.	C. M. No.	WING	TAIL	CULMEN	TARSUS
3305 fall	109,883	113	68.5	11.1	24
3478 spring	110,048	111	71	11.5	23.5
3479 spring	110,049	109	68.5	shot	22.5
Average		111	69.33	11.3	23.33
FEMALE					
3306 fall	109,884	107	62.5	10.2	22

⁵⁷One hundred and sixty-six specimens were critically examined.

Some of Mr. Soper's birds, a very few, including the white-throated bird he calls *arctica*, are assuredly not *alpestris*, and these birds do not even have the heavy bill of that form; but the series on the whole, "the great majority," are certainly *alpestris*, or very closely related to that race, and four Southampton birds, all taken during the season of migration, and in the eastern part of the Island, are plainly of the same race.

Average measurements of twenty breeding male *alpestris* from Baffin Island are as follows: Wing, 113.1; Tail, 69.6; Culmen, 12.3; and Tarsus, 22.8; and of nine breeding females: Wing, 105.2; Tail, 62.7; Culmen, 11.5; and Tarsus, 21.9. Average measurements of four breeding male *alpestris* from the Labrador coast are: Wing, 112.7; Tail, 70.6; Culmen, 13.1; and Tarsus, 23.7.

A comparison of these averages with measurements of the four Southampton birds will show the latter to be a little smaller. When measurements of Southampton *O. a. alpestris* are compared with the average measurements of Southampton *O. a. hoyti*, an astonishing difference between the two forms is revealed, however, nine breeding male of *O. a. hoyti* averaging: Wing, 111.2; Tail, 68; Culmen, 13.6; and Tarsus, 22.7; and four breeding females: Wing, 101.2; Tail, 59.2; Culmen, 11.7; and Tarsus, 21.3.

Southampton *O. a. hoyti*, therefore, while smaller birds than Southampton *O. a. alpestris*, have not only relatively, but *actually*, longer bills; furthermore, the great difference between the bills of the two forms is not evident from our measurements, since that of *O. a. hoyti* is noticeably slenderer and more sharply pointed than in *O. a. alpestris*. The bill of the Southampton *hoyti* is, in fact, longer than the average for fifteen males given by Oberholser (1902, p. 812) for that race: "exposed culmen, 10.5-13 (average 11.4) mm."

Fall Records: Horned larks were seen infrequently about the Post during the fall of 1929. All of these were, apparently, *O. a. hoyti*. At Seahorse Point, however, only *O. a. alpestris* was encountered, two specimens (a male and female) being collected from a small flock, perhaps a family-group, on September 22. I think these birds were in migration, for their winter plumage was complete; but the precise location of their summer-home is, of course, a matter of conjecture.

The latest horned larks of the fall, recorded at the mouth of the Anderson River on September 25 and 26, were probably *O. a. alpestris*.

Spring Records: No spring or summer collecting was carried on in the extreme eastern part of the Island, so it is impossible to say whether *O. a. alpestris* breeds there or not. A flock of five male *O. a. alpestris* (all with yellow faces) were seen at the base of the cliff at Itiujuaq on May 19, 1930, and two of these were collected. Both were in excellent condition, and had much enlarged gonads. Horned larks seen and taken at the Post in relatively flat country at this season were all *O. a. hoyti*, or of the white-faced *hoyti* type.

Other Records: Most of the references to horned larks in this region probably apply to *O. a. hoyti*, though *O. a. alpestris* is sometimes the form mentioned. Oberholser (1902, p. 807) gives the breeding range of *alpestris* as "northeastern British America, west to Hudson Bay, from Newfoundland, Labrador and the head of James Bay northward." Preble (1902, p. 114) lists *alpestris*, but gives no records from this region. Eifrig (1905, p. 240) tells us that three male specimens of *Otocoris alpestris* were taken at Fullerton, May 25 and 26, 1904. I think it likely that these were *O. a. hoyti*. Low (1906, p. 318) only includes *O. a. hoyti*, in his list. Reference has already been made to Soper's (1928, pp. 108-109) discussion of *O. a. alpestris* and *O. a. hoyti* on Baffin Island.

The form we encountered at Chesterfield during the fall of 1930 "presumably" was *O. a. hoyti* (Sutton 1931c, p. 159).

Family HIRUNDINIDÆ.

Genus IRIDOPROCNE Coues.

53. *Iridoprocne bicolor* (Vieillot). TREE SWALLOW.

Eskimo Name: *Tingmük*, meaning simply 'small bird.'

Status: An accidental straggler, taken once during the period of spring migration.

Record: Sometime during the early spring of 1925, probably in mid-May, a small bird was seen at the Post at Coral Inlet, which according to Mr. Copland's and Jack Ford's descriptions could hardly have been anything but a Tree Swallow. The bird appeared during a snow-storm. It fluttered about the windows of the Factor's dwelling all day, and the next day was found dead by one of the Eskimos, who kept its pretty skin for some time as a sort of ornament. The bird was described to me as "a shiny green swallow, with white below, and a short tail." Had it been a Violet-green Swallow, *Tachycineta thalassina lepida* Mearns, I think it would not have been described as "shiny."

Genus HIRUNDO Linnæus.

Hirundo erythrogaster Boddaert. BARN SWALLOW.

This species has never been recorded on Southampton Island. An adult female specimen was, however, taken by Mr. Swaffield at Mansel Island on June 14, 1930 (Sutton, 1932a, p. 43). Preble (1902, p. 123) recorded one at the mouth of a river on the Barren Grounds about twenty-five miles south of Cape Eskimo on August 13. This strong-flying species evidently wanders north occasionally, especially during periods of storm.

Family CORVIDÆ.

Genus CORVUS Linnæus.

54. *Corvus corax principalis* Ridgway. NORTHERN RAVEN.

Eskimo Name: Hantzsch (1929, p. 34) says that the Northern Raven is called *Tullugak* "probably after the voice." I wrote this word *Tooloogak*, and decided, after conversation with the Eskimos, that it was not onomatopoeic, though I am at a loss to offer a better explanation of its etymology. Soper (1923, p. 110) gives us also *Killugak* as one of the names in use on Baffin Island.

Status: The Northern Raven is one of the few birds which is found on Southampton Island the year round, and I am inclined to regard it as the least migratory of the birds of the Island. Individuals of the species doubtless wander a good deal in search of food, especially during winter, and there may be a slight general migration, in which individuals of a given region are replaced during the coldest months by other individuals from farther north. Or, again, individuals from all over the Island may gather in a more or less compact community, when they find food upon which they all may live.

The *Tooloogak* is the earliest of all the birds to nest. In the breeding season it is more characteristic of the rugged eastern third of the Island than of the flat country west of South Bay. It is, however, likely to be found anywhere at any time, in view of its great propensity for wandering.

Records: On the day of my arrival at Southampton, August 17, 1929, a raven was one of the first birds to be seen. A single individual was noted, as it flew about and hovered over the Post buildings. The same bird came about the Post daily for some time, evidently searching for food. On August 20 I saw it flying by with some small, whitish object in its huge bill. It was noisily besieged by a mob of Arctic Terns.

On September 7 at Four Rivers I saw a raven steal warily into a Husky camp near the beach. It walked about among the *tupeks*⁵⁸ obviously seeking something to eat. All at once there was a terrific rush, as a dozen dogs bounded forward, jaws snapping. The raven had little more than enough time to spring into the air and make away, croaking angrily. On September 11 Jack Ford reported that a few single birds had been seen near the Post during our absence at Cape Low. On September 14 one came to the Post and alighted on a nearby rock. The above few records will suffice to indicate the comparative scarcity of this species in the western part of Southampton.

In the eastern part, however, it was much commoner. On September 20 near the mouth of the Anderson River I saw three ravens, which flew slowly in from the eastward, intent upon feeding at the carcass of a whale, which had been killed months before, and which had drifted to shore. One of these birds, a female in bedraggled plumage, I shot.⁵⁹ The feathers of the belly were matted together considerably, as if with heavy oil. The stomach was empty.

On September 21, as we made our way toward Seahorse Point, four ravens circled our motor-boat, croaking and coming very close through curiosity. On September 22 among the rough cliffs at Seahorse Point we saw and heard many ravens. Next to the Herring Gulls, they were probably the commonest large bird of the region. They wandered about the cliffs and fjords, calling in hollow voices, wheeling from one side of a promontory across to the other, ever on the lookout for food. When the natives began shooting at Polar Bears, the ravens momentarily fled, but soon returned, curious and hungry. When the first bear had been killed they quickly gathered, like vultures, circling about over the carcass. I saw nine together at one time, and before noon had little trouble in collecting four specimens, an adult male and three immature females. The adult was in perfect fresh plumage, and he was exceedingly sleek and handsome; the young, however, were in poor plumage. Nearly all the feathers of the throat, head and neck and even of the belly and back, were still partly in their sheaths, though the juvenal plumage had apparently all dropped out.⁶⁰ All these specimens were rather fat. In their stomachs were remains of fish and a good deal of gravel.

On September 23 I saw several at Seahorse Point and on the islands near by. Seated among the rocks, I called one to me from the farthest of the Sempé Islands and shot it without trouble. It proved to be a male, in good plumage. In the stomach were strands of flesh, probably of a seal.

On this date I had a memorable face to face meeting with a Polar Bear. The bear had killed a large Harp Seal, which lay among the rocks not far from the water's edge. As the bear returned to his meal, several Glaucous Gulls and ravens circled above the carcass, dipping down hungrily, calling insistently, and fluttering upward in an annoyed manner, when the bear growled at them, or lifted his nose languidly in objection to their importunities.

From September 24 to 26 at Anderson River I saw ravens daily. They came to feed upon the dead whale, and later upon the remains of a Polar Bear, which the natives had killed.

I did not see any signs of a raven's nest, either at Seahorse Point, or in the gorge of the

⁵⁸The *tupek* is the summer tent of the Eskimos; it is made either of seal- or walrus-skin, or of canvass.

⁵⁹The Eskimos watched this bird falling from the air with solemn-faced interest. Upon seeing it strike the water back-first they said: "Perhaps we will not have good luck in our hunting." The raven is apparently a creature regarded with superstition the world over.

⁶⁰The skins of these specimens were salted for final preparation at a later date. In relaxing and rinsing them in mid-winter, I had much trouble with the loosening of the pin-feathers, and finally was forced to throw them away.

Anderson River, where on the perpendicular walls of the stream there were innumerable niches.

On September 30 and on October 7 and 8, ravens were seen near the Post. On October 23 Jack Ford and Amaulik Audlanat saw a pair at the head of Coral Inlet, where several seals had been killed on the previous day.

On November 13 the Eskimos told me of a raven which had been caught in a fox-trap. They did not bring the specimen in, because the foxes had eaten⁶ off the head.

On November 16 an Eskimo brought in a female specimen from Native Point. The bird had been caught in a fox-trap. It was frozen stiff, of course, when it reached me, and its head, which was completely broken off, had been lost two or three times. The stomach was full of decayed seal-meat and some sort of thin, stiff, plate-like structures, which I could not identify, but which reminded me of the scales of a large fish.

During the winter the ravens followed the trap-lines and stole a good deal of bait. Not infrequently they themselves were caught in the traps. They tried desperately to free themselves, sometimes breaking off and even splintering the ends of their bills in doing so. On November 21 I saw a raven circling over three of my fox-traps, not far from the Post. It came to my call, but would not answer. Throughout December a raven, or perhaps two, continued to steal bait from my traps. They were especially fond of fish and paid little attention to anything which was placed under the snow. This appeared to me to prove either that the birds did not smell the food which they might easily have dug out, or that experience had taught them not to tamper more than necessary about the fox-traps. On December 14 Eevaloo brought in a female specimen, which had been caught in a fox-trap, and Kooshoak, who had just returned from Seahorse Point, reported *Tooloogak* as abundant in that region.

I was interested in the methods employed by these sturdy, sagacious birds in securing food during the winter. Rarely, if ever, did they prey upon ptarmigans or Arctic Hares, though they were known to pursue and even occasionally to wait for lemmings; but their principal food appeared to be the carcasses of walruses, seals, or whales, which were located and regularly fed upon before the winter set in. A dead whale thus sometimes furnishes a flock of ravens sustenance for the winter, after the gulls have departed and the Polar Bears gone to sleep. In patrolling their range they keep an eye open for all seals killed at the edge of the floe, or for caribou, freshly dragged down by the Arctic Wolves. And there are always, of course, the fox-traps, where they can steal bait, pull the foxes to pieces, or tear up the Snowy Owls, which have been caught.

Whether the raven ever hunts at night I cannot say; nor did I ever hear an Eskimo express his opinion on the subject. Certain it is that I never saw a raven at night in the dead of winter, even when the moon was very bright. Southampton is too far south, of course, to have any strictly sunless season, though the days of mid-December are very brief; so it is comparatively easy for the ravens of this region to feed by daylight at a well-known carcass, or other feeding-ground, and seek their roosts again before night-fall.

One of the legends of the Aivilikmiut tends to substantiate my belief that the raven is abroad as a rule only by day. "Once upon a time" (so the story goes) "a long time ago, the raven was an altogether terrestrial being, like the fox. It could not fly. One day the raven and the fox were talking together about their problem of getting a livelihood. Said the fox: 'I like this country where it is dark in winter. It is easy for me to slip up on mice and

⁶This is the only evidence I obtained that the flesh of the raven is ever eaten by foxes. The Husky dogs will not touch it, and a starving Eskimo would, I believe, eat human flesh, before he would eat a raven.

partridges. I am going to stay here always.' 'Well, for my part,' rejoined the raven, 'I prefer a place where I can hunt by day.' So he got himself a pair of wings and flew to a land where there was daylight in winter."

This legend is worth noting. For one thing, the raven and fox are portrayed as friendly toward each other. Not the least interesting feature of the story is the prompt acquisition of a pair of wings by the raven, a stroke of imagination on the part of the Eskimos, which dispenses with all our tedious processes of evolution.

Most of the ravens caught in mid-winter were thin. One caught by John Bull at Leyson Point on January 1, 1930, however, was quite fat. This bird had been living near the whale-carcaass, which we had visited in September, and probably had had no trouble in getting plenty to eat. At times of severe storm the birds must be hard-pressed, and if they cannot find carcaasses, fox-bait, or débris about a Eskimo encampment, they must resort to killing such birds and mammals as they can find and capture. The raven has few natural enemies. The Eskimos will not eat its flesh, and the dogs as a rule will not touch it. Muckik saw a White Gyrfalcon chasing a raven on January 18 at Seahorse Point, and thought the hawk was trying to kill it.

On February 8 Shookalook saw a pair of ravens in the region north of Cape Kendall. He told me they were sometimes common there, when *Tooktoo*, or caribou, were abundant. Doubtless the ravens find food in any region which the caribou frequent, for every caribou killed by the wolves means many meals for the hungry ravens.

The Northern Raven nests wherever there are cliffs which furnish a relatively inaccessible nesting-site. I did not actually see a nest while on the Island, nor were any reported to me; but Kyakjuak and Pumyook saw a mated pair in the high country bordering Fox Channel north of Cape Fisher, on April 28, and these birds were, according to the Eskimos, nesting on one of the cliffs.

I did not see a raven all summer until August 5. The birds evidently keep near their nests during the part of the year when the young have to be constantly fed. With the decline of summer they wander, and appear in the region of the Post at "ship-time" with such regularity that the Eskimos think the birds know when the ship is coming and fly in purposely to meet it.

Annual Routine: The Northern Raven is the most sedentary of the birds found the year round on Southampton Island. It is also the earliest bird to nest. In summer it is to be found principally in the high, rocky part, especially at Duke of York Bay and at Seahorse Point; but in the summer it wanders widely, either in search of food, or because of its natural curiosity. It has practically no enemies, and is regarded with a certain amount of awe by the Eskimos, who have many superstitious beliefs about it.

Other Records: The raven is one of the best known birds of the Arctic, and many of the earlier travellers mention it, either as one of the few birds met with in the dead of winter, or as one of the characters in native legends. Rae apparently did not take a specimen at Repulse Bay. Kumlien (1879, p. 78) found it common about Cumberland Sound, Baffin Island. Preble (1902, p. 115) cites a few references applying to the Hudson Bay region. Eifrig (1905, p. 241) states that the species was "seen at Cape Fullerton throughout the winter." Low (1906, p. 319) says: "A pair remained throughout the winter in the neighborhood of Fullerton."

Mr. Ford told me that he had always regarded the raven as a common bird on Southampton and Coats Islands, especially at Seahorse Point and Cape Préfontaine. Soper (1928, p. 110) found it one of the most widely distributed species of Baffin Island. Mathiassen (1931,

p. 28) says: "During the last week of August we saw there [at Kûk] the raven (*Corvus corax*) . . . " In the same paragraph he says: "On the whole journey across the island during the month of October we saw only three ptarmigan . . . and one raven, and while at Darkness Lake during the winter only one raven and one snowy owl." Mr. Swaffield did not take a specimen at Mansel Island, though he probably saw it there, during 1929 and 1930. We did not see it at Chesterfield during the fall of 1930 (Sutton, 1931c).

Family TURDIDÆ.

Genus HYLOCICHLA Baird.

55. *Hylocichla guttata faxoni* Bangs and Penard. EASTERN HERMIT THRUSH.

Eskimo Name: *Tingmiik*, meaning 'small bird'; or *Adla*, meaning 'stranger', or 'little stranger.'

Status: An accidental straggler, recorded once during the period of fall migration.

Record: On October 4, 1929, I saw a Hermit Thrush running and hopping about in the snow, trying to find something to eat among the grass partly buried in snow and the stunted willows in a little valley between two ridges about three miles east of the Post. It appeared to be quite strong, when standing, but flew weakly. Upon preparation it proved to be a very much emaciated female, the stomach being virtually empty.

This bird probably had been blown to Southampton during the wild gale of October 2 and 3. On those dates the wind constantly blew with terrific force from the south and west.

Other Records: Preble (1902, p. 130) says: "Though it doubtless occurs in southern Keewatin, I find no published records of such occurrence."

Genus OENANTHE Vieillot.

Oenanthe oenanthe leucorhoa (Gmelin). GREENLAND WHEATEAR.

James Clark Ross (1835, p. xxvi) recorded a specimen of *Sylvia ananthe* obtained at Felix Harbor, Boothia, not far to the northwest of Southampton. Kumlien (1879, p. 73) found it breeding on both shores of Cumberland Sound, Baffin Island. Preble (1902, p. 131) says: "If, as is probable, this bird inhabits the country to the north of Hudson Bay, its most natural route of migration would seem to be along the borders of the Bay,⁶² and it is not unlikely that it is a regular breeder about the northern shores." Hantzsch (1914, pp. 130-131) recorded a few birds during June, 1910, at "the extremity of Nettilling fiord," Baffin Island, and on June 13, 1910, at Amittok Lake. Soper (1928, p. 110) considers it "one of the rarest birds of Baffin Island," and gives us a few records.

I noted the species myself at Lake Harbor, Baffin Island, during the summer of 1929, a family-group, wide tails prettily spread, flitting about among the boulders catching insects. I did not, however, see it, nor hear any reports of it at Southampton Island.

Family MOTACILIDÆ.

Genus ANTHUS Bechstein.

56. *Anthus spinoletta rubescens* (Tunstall). AMERICAN PIPIT.

Eskimo Name: Soper (1928, p. 115) tells us that the words *Kungnuktuk*,⁶³ *Aivioktok*, *Nedtiadjok*, and *Kernertak* ("according to Hantzsch") are used as names for this species

⁶²This is probably a somewhat misleading statement. According to the Committee of the American Ornithologists' Union (1931, p. 262) the winter-range of the species is *West Africa*. In leaving Baffin Island the wheatears probably pass first to the eastward and then south "through the British Isles and France."

⁶³This word *Kungnuktuk* is very similar to the name of the Lapland Longspur, which was in wide use on Southampton. I was told that this word referred in some way to the black throat of the male bird.

on Baffin Island, but he does not give us the etymology of any of these words. Hantzsch (1929, p. 57) translates *Avioktok* (or *Aviortok*, as he spells it), as "one, who knocks on something; on account of the short, rapping call-note."

The only name I heard for the bird on Southampton was *Ingiuaituk*, meaning "he moves his tail." *Ingiuaituk*, then, is a precise equivalent of our word *wagtail*.

Status: The Pipit may be found in summer anywhere on the Island, but it is not common, and it is rather local. It is somewhat commoner in the eastern part, where it nests in the sheltered valleys between the ridges. It lingers rather late in the fall, but does not appear very early in the spring according to the few records I obtained.

Fall Records: On August 18, 1929, one was seen at the edge of a pool about a mile east of the Post. On August 21 several small, loose flocks were observed inland about four miles from the Post, along the rocky and almost dry bed of a stream, which led down to the bay from a large lake. I think these flocks were family-groups. A female in perfect juvenal plumage was collected. Associating with these Pipits were flocks of Lapland Longspurs and Snow Buntings.

The Pipit was noted at several points along the southern coast during latter August. At Cape Low, however, it was decidedly rare. Single individuals were seen on September 2 and 3. A few were seen at Four Rivers, from September 4 to 8. From September 10 to 12 a few were noted at the head of South Bay.

Judging from their behavior and from their moulting condition, I think most of the birds seen thus far during the period of autumnal migration were locally nesting birds and their young. On September 13 a female in very poor plumage was taken about seven miles inland from the Post, and young birds noted on that date were not in good feather. Such birds probably were not migrating. On September 14, however, there was a noticeable influx of Pipits in the region to the northward of the Post, and all these birds were in excellent plumage.

On the trip to Seahorse Point the species was recorded at Leyson Point on September 20 (one), and in the vicinity of Seahorse on September 22 and 23 (several). On October 2 a male and female were collected at Seal Point. Neither bird was fat. They were taken at points about two miles apart, in deep grass along the margins of the frozen coastal lakes, not far inland from the salt-water. On October 8 one was taken near the Post. It was found in a damp place between two rocky ridges, searching for food among the grass.

On October 12 the last Pipit of the season was noted. Four inches of snow covered the tundra everywhere save along the outlets of the largest lakes, where water continued to trickle through the grass and to melt the snow as fast as it fell. Here congregated all the small birds which were to be found anywhere in the region, a pair of Snow Buntings, an occasional redpoll, and this Pipit, which I collected. The specimen proved to be an exceedingly fat female in its first winter-plumage.

I was surprised that this species, which according to the structure of its bill is decidedly more insectivorous than the buntings or redpolls, should linger so late in the season in this inhospitable region. The last horned larks were noted on September 26, and the last longspurs on October 10. Only the Snow Bunting and various species of redpolls, apparently, disappear later than the hardy Pipit.

Spring Records: Although the Pipit lingers late in the fall, it does not return *en masse* among the earlier arrivals. Occasional individuals, representing the vanguard of the northward moving host appear early. Such a bird was seen for a few moments perched on the ice not far from our camp at the edge of the floe on May 28, 1930. I had a satisfactory look at it before it swung off, its white outer rectrices showing plainly.

On June 1 one was seen and heard on a high ridge back of the Post. The call-note was the characteristically repeated "*tsi, tsi,*" which is given as the bird mounts erratically skyward and makes off.

On June 7 two birds (perhaps a mated pair) were seen at the head of South Bay. Both birds were nervous and wary. On June 8 two more were seen near the Post. On June 10 a female with somewhat enlarged gonads was collected at Seal Point. This bird apparently had no mate. On June 11 one was noted, as it fed along the beach near the Post.

On June 13 two Pipits were seen and the first and only flight-song was heard. I spent much time looking for a nesting pair about the Post, at the mouth of the Koodlootok River, along the base of the gravel plateau at Itiuachuk, and especially at Poorhouse Hill, where the species certainly should have been common. I, however, never found a nesting pair, nor discovered a nest. The following mid-summer records were made: One on June 17 at Seal Point; one on July 14 at the head of South Bay; and one on July 18 on a ridge about two miles east of the Post. The rarity of this species during the fall, and its great rarity during the spring and summer amazed me, for I had expected the Pipit to be one of the commonest of the summer birds.

Other Records: Rae apparently did not take a specimen of this species at Repulse Bay for none is accredited to him in the British Museum Catalogue of Birds. Kumlien (1879, p. 73) found it common about Cumberland Sound, Baffin Island, where he noted that it began nesting about June 20. Preble (1902, p. 128) lists the species, but gives no references which apply to this part of Hudson Bay. Eifrig (1905, p. 241) and Low (1906, p. 319) agree that the Pipit is usually characteristic of the Hudson Bay region. Low says: "The Pipit is common along the shores of Hudson Bay. Skins and eggs from Fullerton."

Mr. Ford told me he had seen the Pipit every year on both Southampton and Coats Islands, but that it was never common. Soper (1928, p. 115) gives us a good account of the species in southern Baffin Island, where it is apparently rather common. Mathiassen (1931) evidently did not see it during the fall of 1922. Mr. Swaffield did not take a specimen at Mansel Island during 1929-30 (Sutton, 1932a). To my surprise I found it fairly common, however, on the mainland west of Southampton, especially in the vicinity of Chesterfield (Sutton, 1931c, p. 159).

Family COMPSOTHYLIDÆ.

Genus DENDROICA Gray.

57. *Dendroica coronata* (Linnæus). MYRTLE WARBLER.

Eskimo Name: This species was unknown among the Eskimos.

Status: An accidental migrant, recorded once from the Island, in the fall.

Record: On October 7, 1929, I found in the stomach of a White Gyr Falcon the remains of a Myrtle Warbler in winter plumage, probably a male. Among these remains were the sternum, feet, mandibles with part of the skin of the crown and throat attached, and most of the rectrices. The feathers in the region of the throat were all *white*, so the bird could hardly have been an Audubon's Warbler, *Dendroica auduboni auduboni* (Townsend).⁶⁴

Among the feathers and bones was a considerable amount of flesh, indicating that the bird had only recently been eaten. It is probable that this warbler, like the Hermit Thrush

⁶⁴Taverner (1926, p. 319) says of the Audubon's Warbler: "Occasional young birds without the yellow throat are practically indistinguishable from that species [Myrtle Warbler], but in the majority of specimens enough yellow is suggested for the recognition of the species."

taken on October 4, had been blown to Southampton by the terrific gale of October 2 and 3, from the west or southwest.

Other Records: The nearest point at which this species has been recorded is apparently Churchill, along the west coast of Hudson Bay, considerably south of Southampton (see Clark, 1890, p. 322).

Family FRINGILLIDÆ.

Genus ACANTHIS Borkhausen.

58. *Acanthis hornemanni hornemanni* (Holboell). HORNEMANN'S REDPOLL.

Eskimo Name: All the redpolls were known among the Aivilikmiut as *Shukshigiuk*. This largest and palest form was occasionally referred to as *Shukshigiuk kadlowktuk*, the latter word meaning *white*. *Shukshigiuk* is probably an imitation of certain call-notes, which the birds give in flight. Hantzsch (Soper, 1928, p. 110) says the name for the redpoll in use in Baffin Island is *Saksariak*.

Status: Hornemann's Redpoll does not, so far as I have been able to determine, nest anywhere on Southampton. It is irregularly common as a migrant, being about equally numerous in autumn and spring. It is said by the Eskimos to be commoner in the eastern higher part, than to the west of South Bay. During migration it associates with all the other species of redpolls which are to be found in this region, so that it is sometimes difficult to identify the birds, as they fly about together. It lingers later in the fall than the other redpolls, however, and apparently returns a little in advance of them in the spring. It is rarely seen even in mid-winter, when it feeds upon such seeds as have not been buried under the snow. During the winter of 1929-30 we did not record it, but it was the latest small bird to be seen in the fall.

In the hand this species is not difficult to identify, for it is large in comparison with other members of the genus, and very *white* in appearance. I collected a series of ten specimens at Southampton, five males and five females, the measurements of which follow.

Measurements in millimeters of *Acanthis h. hornemanni* from Southampton Island.

MALES					
H.M.S. No.	C. M. No.	WING	TAIL	CULMEN	TARSUS
3313	109,891	84	68.5	9.5	16.5
3355	109,931	85	67.5	9.5	15.5
3357	109,935	86	68	9	16.5
3393	109,968	85.5	64	9	17
3481	110,051	83.5	67.5	9.5	17
Average		84.8	67.1	9.3	16.5
FEMALES					
3356	109,934	80	64	8	15
3358	109,936	83	66	8.5	16
3359	109,937	82.5	62.5	8.5	16
3376	.....	80	63.5	8	15.5
3392	109,967	81.5	62.5	8	15
Average		81.4	63.7	8.2	15.5

Fall Records: The first redpolls recorded during the fall of 1929 were seen among the boulders on the crest of a rocky hill near Seahorse Point on September 21. On this date a mixed flock of about thirty birds were seen, some of which were plainly larger and whiter than the rest. They were feeding among the grass and moss. When I disturbed them, they

all flew up to the rocks, where they sat in rows and companies. While I watched them, a young Duck Hawk came by and dashed after them. Though I succeeded in getting the hawk, the redpolls all got away.

On September 25, while I was walking along the beach not far from the mouth of the Anderson River, a redpoll swung deliberately down from the sky and alighted on a boulder not far from me and began to swallow the snow. As I approached, it flew up and circled a few times before settling again. The specimen, which proved to be a female Hornemann's Redpoll, was very fat. The stomach and crop were well filled with small seeds. The call-notes of this bird were in some indescribable way different from the call-notes of other redpolls, with which I was familiar, being huskier and rougher than those of the Greater Redpoll, for example.

On October 7 a flock of nine redpolls visited the Post. After a good deal of chasing we succeeded in getting seven specimens, five of the present form, and one each of the Hoary and Greater Redpoll. Among the five *A. h. hornemannii* secured only one was an adult male, and this bird, with its delicately rosy breast and touch of pink on the frosted rump, was lovely indeed. The other specimens were an immature male, and three immature females. These may have been a family-flock, which were making a southward migration together. I thought the Hornemann's Redpoll rather a dignified bird, more so than the smaller species. While the Greater Redpolls, in particular, bustled about, squealing and erratically fluttering into the air, the big Hornemann's Redpolls sat quietly on the rocks, their plumage fluffed out until they appeared almost round.

On October 10 near the Post three were seen perched on the big boulders at the head of a small inlet. I gave chase, but did not succeed in getting any of them. Later in the day I came upon a single bird feeding among the partly snow-covered moss and grass at the edge of a frozen lake back of the Post. This bird was excitable and wary, but at the same time curious. After it flew up it circled back to look at me more closely and alighted close by. Upon collection it proved to be of this form. I think it was a female, though the gonads were too much mutilated to be satisfactorily recognized.

On October 12 two large pale-colored redpolls were seen flying over the Post. Similarly large whitish birds were noted on the 17th. On October 19 four redpolls of three kinds were taken near the Post. Two of these, apparently an adult female and a young male, were of the present form.

During latter October redpolls were frequently heard as they flew over, but they were not often seen; and they only rarely stopped to feed or rest on the ridge of one of the Post buildings. The small flocks noted during early autumn were nearly always composed of two or more species of redpoll; later in the season, however, the smaller varieties were not seen.

The latest record of a redpoll for the season, or, for that matter, of any small bird, was of a single individual of the present form noted on November 2, about five miles north of the Post. This bird swung down from the sky in response to my squeaking, and circled round me once, but did not alight. It flew off toward the southwest.

Winter Records: As noted, we did not see any redpolls during the winter of 1929-30. Mr. Ford, however, remembered having seen this species in January or February of a former year (probably 1925 or 1926) along the brooks at the head of South Bay. Here the willow bushes were not always covered, and the wind sometimes kept part of the tundra comparatively free of snow, so the little birds could find food. Jack Ford also remembered seeing the birds during the dead of winter in a sheltered prairie south of Poorhouse Hill.

Spring Records: According to the official diaries of the Hudson's Bay Company, Jack

Ford and the Eskimo boy, Eenook, saw a flock of these hardy birds back of the Post on March 25, 1927. They were feeding among the exposed willow-twigs and dry grasses. It is not possible, of course, to say whether this record marks the beginning of the northward migration, for the birds may have been over-wintering individuals.

During 1930 the first small bird of the spring, a Hornemann's Redpoll, was seen on March 29. My field-notes for this day read, in part: "A single bird flew over the Post slowly, heading toward the north, at about 3 P.M., calling in its characteristic *chinky* voice. The sky is somewhat cloudy. Thermometer 2° below zero at 7 o'clock this morning, warmer at noon. No wind."

On March 31 two flew by the Post, heading northeastward. April 1 one was seen at the head of the Bay, flying above the rough ice of the harbor. At about this date, the Eskimos reported seeing a few 'white' *Shukshigiuk* along the floe near Native Point and beyond Bear Island.

On May 20 a dull-colored male with much enlarged gonads was collected from a large flock of Snow Buntings to the south of the high cliffs at Itiujuaq. I had expected this bird to be a female, since there was no trace of pinkish on either breast or rump. It apparently was not mated, though on the preceding day other redpolls had been seen, and one specimen of the Greater Redpoll collected. No Hornemann's Redpoll was recorded anywhere on the Island after this date.

Annual Routine: This is one of the few species which occur on Southampton as migrants, but do not nest. It arrives from its breeding-ground to the north (probably Greenland) in the middle of the fall, and mingles freely with the other redpolls, which are found in this region. It is apparently more hardy than either the Hoary or the Greater Redpoll, and often lingers later in the fall than they, or even throughout the winter, when food is to be found.

It arrives as the first of the small birds in spring. In the fall family-groups are often to be seen flying about together; in the spring, however, single birds or pairs as a rule are seen.

The only creature, which I actually saw molesting this species, was the Duck Hawk.

Other Records: Preble (1902, p. 118) says: "Clarke recorded two adults collected many years ago at Fort Churchill (1890, p. 322). Murray's record of *Linota borealis* from Severn House may be referable to the present form, or to *exilipes* (Edinburgh New Philosophical Journal (new series), IX, p. 223, 1859)." Neither Eifrig (1905) nor Low (1906) even mentions the species. Ridgway (1901, p. 81) makes the following statements as to its range: "Resident in Greenland, where breeding to latitude 70°; Iceland; Spitzbergen; Jan Mayen Land. In winter southwestward to Ungava (Fort Chimo, September 1 to May 15), irregularly to west side of Hudson Bay (Fort Churchill). . ." Soper (1928, p. 110) gives us several records for Baffin Island, among others one of two birds taken from a small flock at Pangnirtung fiord on December 31, 1925.

59. *Acanthis hornemanni exilipes* (Coues). HOARY REDPOLL.

Eskimo Name: *Shukshigiuk*, as the other redpolls.

Status: The Hoary Redpoll is rather a rare and decidedly a local summer resident on Southampton, probably somewhat commoner in the central and eastern parts than in the flat country about Capes Low and Kendall. At the head of South Bay several pairs were known to have nested near the mouth of Ford's Rivers, at the mouths of the Koodlootok and Kirchhoffer Rivers, where was a considerable growth of willows, and at Poorhouse Hill.

It arrives early in the spring, earlier than the Snow Bunting and Lapland Longspur, but not usually so early as the closely related, but much larger Hornemann's Redpoll. Records of migrant individuals are likely to be open to question, unless specimens are collected, since all the redpolls flock together, save at the very height of the nesting-season. The Hoary Redpoll lingers late in the fall, departing for the south along with the hardy Hornemann's Redpoll, when the deep snow covers its food-supply.

A series of eleven specimens was collected. Five of these are juvenals,⁶⁵ whose bills are probably not fully developed, the culmen measurements therefore probably to be disregarded; the wings and tails of these birds are, however, full grown. The plumage of the summer adults is greatly worn, so much so, in fact, that in comparing the four winter birds with the two summer birds one can scarcely believe them to be of the same species. Throughout the entire series, however, the middle toe is clearly too short, and the bill too small for *Acanthis linaria linaria*, though the summer Hoary Redpolls have superficially the same appearance as the female Common Redpoll taken on June 10.

Measurements in millimeters of *Acanthis hornemanni exilipes* from Southampton Island.

MALES⁶⁶

G.M.S. No.	C. M. No.	WING	TAIL	CULMEN	TARSUS
3345 (winter)	109,923	73.5	57.5	8	13.5
3385 (winter)	109,960	74	61.5	8	14
3391 (winter)	109,966	74	60	8.1	13.4
3706 (summer)	110,262	71	54	7.9	14.2
3067 (juvinal)	109,661	73.6	57	7.4	13.6
3106 (juvinal)	109,699	73.3	56	7	13.5
3121 (juvinal)	109,711	71.5	49.5	6.7	12.9
3122 (juvinal)	.....	76.5	59	7	14
Average		73.42	58.06	7.51	13.64

FEMALES

3360 (winter)	109,938	71	57	7.5	13
3123 (summer)	109,712	70.1	56	7.1	14
3107 (juvinal)	109,700	70.1	55.5	7.4	14.6
Average		70.4	56.16	7.33	13.87

Fall Records: Redpolls of any sort were decidedly uncommon birds on Southampton. I had expected to see flocks of hundreds of birds, especially during the fall migration, but I never saw a really large flock anywhere. Little bands of three or four individuals were all that I could find. Young birds, which had been reared in the vicinity, were seen at the Post on several occasions during the late summer and fall of 1929. On August 19 such a young bird, just entering upon the post-juvinal moult of the body-plumage, was observed along the beach not far from the buildings at the Post. It flew from rock to rock rather nervously, drinking from the little pools, picking up seeds and bits of sand. It was collected. Another young bird was seen on the following day.

On August 23 a family-group of four young birds was encountered at the head of the bay, and a male and female were collected. I carefully looked at all these birds with my binocular and think the adult female was with them. They were all tame and rather curious, and behaved much like Goldfinches, *Spinus tristis tristis* (Linnæus). Most of the time they perched

⁶⁵ Four males and one female. One of these, marked "female (?)" is probably a male, since its measurements are the largest in the series.

⁶⁶ The smallness of the summer male specimen taken (G.M.S. No. 3706) is not entirely due to wear; the bird is, perhaps, an under-sized individual.

on the tops of the rocks, sitting in groups of two or three, uttering their conversational chirps and fine, canary-like squeals. Neither of the specimens taken was fat.

On August 24 two or three family-groups were seen not far from the Post, about fifteen birds in all, most of them young, and all going about together in one flock. From these I collected two juvenal males, and an adult female. All these birds were moulting, especially the adult female, most of the rectrices of which were absent. The behavior of these birds greatly interested me. They were feeding on willow-seeds. As they perched on the slender twigs, they leaned this way and that, turning their heads about gracefully. Part of the time they hopped about on the ground. When disturbed, they flew up with squeals and chirps, and bounded about in erratic circles, only to return abruptly to their feeding. The young birds were not at all wild, sometimes refusing to fly even after a shot had been fired, and paid little attention to me; the adult birds, however, showed concern over the safety of the young. I did not see any male with rosy breast. Upon examination, the stomachs of all these birds proved to be well filled with willow-seeds, though none of the specimens was fat.

On the trip to Cape Low but few redpolls were seen. The following records which are thought to apply to the present form, though no specimens were taken, were made: a single individual was seen at Hut Point on August 29; a single juvenal individual was noted at Hut Point on August 31; another single bird was observed at Hut Point on September 1; a small flock (four birds) at Cape Low September 3; and two at Four Rivers on September 5.

On September 14 a single bird, thought to be an adult, was seen among the boulders along the crest of Poorhouse Hill about seven miles north of the Post. On the same date I found an old nest, probably of this species, in a little willow-bush. It was placed on a stout branch about eight inches from the ground. The bush, which was a large one for this region, was growing in a sheltered place among the boulders. The nest was built of plant-fibers and warmly lined with soft materials, including feathers and hair.

On September 21 on a high rocky hill not far from Seahorse Point I saw a mixed flock of about thirty redpolls perched on the boulders. Most of these were the large, white-colored Hornemann's Redpolls, easily recognizable even at a considerable distance; but the others were smaller, darker birds, and I think that most of these represented *A. h. exilipes*.

On October 2 a single individual believed to be of this form was seen near the Post.

On October 4 to the southward of Poorhouse Hill in a wide plain, where many Snow Buntings were feeding, I saw and watched three redpolls for some time, and finally secured one, an immature male, which proved to be of the present form. These birds were very tame at first, but became exceedingly wild upon being pursued. They fed much of the time on the ground with the buntings. When alarmed, they flew to a rock nearby, where they sat in a close-knit group watching me suspiciously. After I had collected the one bird the other two swung off, mounted higher and higher, and made for some far off feeding-ground.

On October 7 a flock of three redpolls visited the Post during the afternoon. All these birds were collected. One proved to be an immature female of the present form; the others were a young female Greater Redpoll and an adult female Hornemann's Redpoll. On the same date a separate flock of Hornemann's Redpolls also were seen.

On October 15 three redpolls visited the Post and fed among the exposed lichens and grass-tops at the base of the flag-pole. One of these, being collected, proved to be an adult female Hoary Redpoll. It was in the midst of what must have been a considerably delayed post-nuptial moult; there were many pin-feathers in the plumage, and only about half the rectrices were present.

On October 18 a single bird, believed to be of this form, was noted, as it flew over the buildings at the Post.

On October 19 four redpolls were shot by the Eskimos near the Post. Two of these were Hornemann's Redpolls; one was a Greater Redpoll; and one an immature male of the present form. As a rule the flocks of redpolls were composed of birds, which even in the field appeared to be of different varieties, and it was impossible to be sure what they were without collecting all the birds. Redpolls were seen considerably later than October 19, but it is my belief that these later birds were all the larger *A. h. hornemanni*.

Spring Records: Certain of the redpolls seen during the early spring, but not collected, may have been of this species, though the two birds which stopped near the Post on April 8, 1930, were certainly Greater Redpolls. The first individual of the present form definitely identified was a white-rumped female (?) seen along the edge of the ice at the head of South Bay on June 11. On June 13 one was seen near the Post, and Jack Ford saw several (thought to be of this form) among the willows to the west of the cliff at Itiujuak.

On June 16 I saw a pink-breasted male bird high in air, and heard it sing beautifully as it flew along. This was the only full redpoll flight-song I heard during the entire year on the Island.

On July 5 a male was collected at the head of South Bay. Although this bird had the external appearance of a female rather than of a male, the gonads were much enlarged, and it must have been breeding in the vicinity. No song was heard. On July 11 a male was seen flying overhead, about three miles north of the Post.

I made several trips to the mouth of the Koodlootok River during the spring of 1930 with the hope of finding these birds nesting, but was completely disappointed. The Eskimos told me that they saw nesting birds along the Kirchhoffer River in mid-July, and some of them said they had seen nests with "blue" eggs.

Annual Routine: The Hoary Redpoll is apparently the redpoll characteristically resident during summer in the southern part of Southampton Island. Other varieties may nest in the region of Duke of York Bay or along the high country bordering Fox Channel. It arrives early in the spring, though our few records seem to show that it reaches Southampton somewhat later than either the Greater or Hornemann's Redpoll, both of which are believed to nest farther north. During the migration all the redpolls go about in mixed flocks. So far as I could determine, males and females arrive at about the same time, and they probably are mated at the time of their arrival. I did not see any actual courtship, and heard only one flight-song. I learned nothing as to the building of the nest, laying of the eggs, and rearing of the young. Nests are built not far from the ground in willows. They are compactly made of vegetable fibers, hair, and feathers.

In the late summer and fall the family-groups go about together, feeding upon seeds. In the flocks observed there were no pink-breasted males. The post-nuptial and post-juvinal moult take place almost simultaneously, and are well completed before the birds depart for the south. During the fall all the varieties of redpolls again assemble in mixed flocks. They go south as soon as the snow covers their food. Their principal enemies are the jaegers and the Duck Hawk.

Other Records: Preble (1902, p. 118) says: "Three specimens from York Factory and one from Fort Churchill, collected in July, are referable to this form." These are the nearest points at which the variety has been taken, so far as I can determine. Neither Eifrig (1905) nor Low (1906) records the bird, and apparently Soper (1928) did not see it on Baffin Island.

60. *Acanthis linaria linaria* (Linnaeus). COMMON REDPOLL.

Eskimo Name: *Shukshigiuk*, as the other redpolls.

Status: An irregular migrant or visitant, actually only once recorded on the Island (specimen taken).

Record: On June 10, 1930, a solitary, non-breeding, adult female *Acanthis* was taken at the head of South Bay. The specimen, which is before me as I write, is in much worn and perhaps faded plumage, and has a decidedly dingy appearance. The breast and sides are quite heavily streaked, as the result of exposure by wear of the dark bases of the feathers.

Since *Acanthis hornemanni exilipes* is the form of redpoll usually found in mid-summer at Southampton, and since this specimen bears a strong superficial resemblance to two mid-summer specimens of that form which I collected, I at first identified it as a Hoary Redpoll.

I am now of the opinion, however, that it is *linaria*. My identification is not based upon the streaked appearance of the rump, for the rump in the two mid-summer Hoary Redpoll specimens also before me, is quite as dark in appearance as a result of extensive wear, as in the present specimen; nor is it based upon measurements in general, for female *h. exilipes* and *l. linaria* are similar in size in most respects. The bill of the present specimen is too large for a Hoary Redpoll, and the middle toe, which measures 8.6 mm., is definitely too long for that species. This last-named measurement, strange as it may seem, appears to furnish the most conclusive proof of the identity of the bird, for the middle toe in *all* the Hoary Redpolls (males as well as females) at hand is shorter than this by at least 1 mm.

The measurements of the specimen in question (in millimeters) are as follows: Wing: 71.3; Tail: 55 (perhaps a trifle long for an average *A. linaria*, ♀); Culmen: 8.8; Depth of bill, at base: 5.9; Tarsus: 15.2; and Middle-toe, without claw: 8.6.

There is a suggestion of pink in the malar region, which led me for a time to think that I had wrongly sexed the bird; but whether the bird be male or female the length of the middle toe in either case is too great for *A. h. exilipes*, and of course too short for *A. l. rostrata*, which is a much larger bird.

Other Records: Kumlien (1879, p. 75) lists *Aegiothus linaria* as common on at least parts of Baffin Island. Preble (1902, p. 118) mentions several specimens taken about Hudson Bay, but none of these references applies to the Southampton region. Eifrig (1905, p. 240) tells us that "one was taken April 26, 1904, at Fullerton, where it was rarely seen." Low (1906, p. 319) says: "A few seen about the ship in the spring at Fullerton." Soper (1928, p. 111) evidently did not take nor see it on Baffin Island. Since the redpolls are so difficult to identify, I think it possible that any of the above cited references may apply to another form than *A. l. linaria*.

Acanthis linaria holboelli (Brehm). HOLBOELL'S REDPOLL.

Soper (1928, p. 111) says: "A specimen taken in Grinnell Bay by Kumlien (1879, p. 76) on September 3, 1877, was pronounced by Ridgway to be this species."

Since all the redpolls wander a great deal, this form probably is to be found occasionally in the Southampton region.

61. *Acanthis linaria rostrata* (Coues). GREATER REDPOLL.

Eskimo Name: The Aivilikmiut did not as a rule distinguish between the different species of redpolls. They called all of them *Shukshigiuk* or *Saksariak* (Soper, 1928, p. 111).

Status: The Greater Redpoll may nest locally on some part of Southampton, though

no breeding specimens were taken, nor were any juvenals collected in mid-summer or early fall. If it nests, it very likely does so chiefly in the higher eastern part of the Island, since we did not see any about South Bay or Cape Low during the late summer of 1929. It principally occurs as a migrant, and is apparently rather irregular. It is to be found with the other species of redpolls during the fall, and like them usually leaves the region entirely during the middle of the winter, returning in the spring a little in advance of the Snow Buntings and Lapland Longspurs.

Measurements of the five specimens collected are given below.

Measurements in millimeters of *Acanthis linaria rostrata* from Southampton Island.

MALES					
G.M.S. No.	C. M. No.	WING	TAIL	CULMEN	TARSUS
3480	110,050	79.5	62	10	16.5
3551	110,117	80	62.5	10.5	17
Average		79.25	62.25	10.25	16.75
FEMALES					
3272	109,855	77	59.5	9	16.5
3361	109,939	78	60	8.5	16.5
3394	109,969	76	58	9.5	16
Average		77	59.17	9	16.33

Fall Records: Redpolls were never common birds at Southampton, and during the first few days of work about the Post I was disappointed at seeing so few of them. Those that were seen were, as a rule, in bad plumage, and I could not find any brightly colored males at all. The several young birds in juvenal plumage, which I took at South Bay, all proved to be *Acanthis hornemanni exilipes*.

My feeling is that identification of redpolls in the field, with the possible exception of the big Hornemann's Redpoll, is practically impossible. During the early fall of 1929, I saw one or two birds, which I thought belonged to this form, but I did not collect them. The first specimen was actually collected on September 17 at the head of South Bay. The bird was alone, a female, and judging by the softness of its skull, a young specimen.

On September 20 at the mouth of the Anderson River a dark-colored bird, which I thought was of this species, was seen with a flock of redpolls not far from the beach. On September 22 at Seahorse Point a very wild, pink-breasted individual, which would not let me approach it within gunshot, was watched for some time. I think it was an adult male of this form. On September 29 a dark-colored bird flew over the Post calling loudly.

On October 7 many redpolls were seen near the Post. In the morning a flock of Hornemann's Redpolls came by, and five specimens were taken. In the afternoon other small flocks kept swinging about, and from these a specimen each of the Hoary and Greater Redpoll were secured, that of the latter form proving to be a female in first winter-plumage. On October 13 a solitary bird, which I think was of this species, flew by the Post, but did not alight.

On October 19 a small flock of redpolls visited the Post and Keetlapik and I got four specimens, two of which were Hornemann's Redpolls, one a Hoary Redpoll, and one an adult female of *A. l. rostrata*. The autumnal flocks of redpolls were almost always composed of different species. The behavior of the different forms, so far as I could see, was the same. They all fed upon the seeds of various low-growing plants, and the stomachs of all specimens

taken were well filled with this sort of material. The Greater Redpoll taken on this date was feeding by itself among some large boulders.

No specimen of *A. l. rostrata* was taken later than October 19, during the fall of 1929, and I think that all redpolls seen later in the season were Hornemann's Redpolls.

Spring Records: On April 8, 1930, two redpolls, one of which was certainly a male and the other probably a female, were observed for some time near the Post. They were so dark that I feel sure they were of this form. They appeared to be mated. The male sprang nervously into the air once or twice, as if indulging in some sort of courtship antics, flitted about in narrow erratic circles, and alighted again near the other bird. Both were feeding among the lichens at the edge of some large, bare rocks. I was so much interested in their behavior, that I did not collect them when I had opportunity; and when they flew off, they disappeared in the distance.

On the following day another (or perhaps the same) pair were seen flying northward along the edge of the frozen bay. On April 25 Mr. Ford saw one near the Post, which he described as 'black.' On April 28 a flock of four 'black' redpolls came about the buildings of the Post and alighted on the roof of the store. Individuals believed to be of this subspecies were seen several times during the following weeks as follows: on May 8 a single bird at the edge of the ice-floe, about six miles west of Native Point; on May 12 two birds, probably a mated pair, at the floe south of Bear Island; on May 15 a flock of eight or ten birds, very likely composed of more than one subspecies, seen by Jack Ford feeding among the bare spaces on the crest of Bear Island; and on May 18 a male, which flew over the Post.

On May 19 in the sheltered bare prairie south of the cliff at Itiujuaq, a very beautiful, but rather worn adult male Greater Redpoll was taken from a large flock of Snow Buntings. A few other redpolls also were seen. Some of these appeared to be dark in color and with streaked rumps, and one proved to be a Hornemann's Redpoll. The Greater Redpoll taken on this date was very fat, and its stomach was well filled with seeds. The gonads were much swollen. It was not accompanied by a mate, so far as I could see.

On June 10 a Greater Redpoll (sex uncertain) was collected at the head of South Bay, where it was feeding along the shore in the short grass. A Common Redpoll was taken on the same date, but the two birds were not seen together. I think the Greater Redpoll was an unmated, non-breeding individual.

Annual Routine: So far as I know, the Greater Redpoll has never been seen in winter on Southampton. It arrives in spring, at about the same time as the other redpolls, in advance of the longspurs and buntings. During migration it frequently associates with the other redpolls. If it nests on Southampton, it probably does so only in the higher eastern part, where in the sheltered gulches there may be extensive growths of willows.

In late summer no Greater Redpolls are to be seen among the flocks of juvenal Hoary Redpolls, to the best of my knowledge. I regard this as fair evidence that the Greater Redpoll does not nest at the head of South Bay, for at other seasons all the redpolls go about together. The food-problems, natural enemies, and behavior of *A. l. rostrata* are the same as those of other redpolls.

Other Records: Preble (1902, p. 118) does not even mention this form from the Hudson Bay region, though he records *A. l. linaria* from several points. Eifrig (1905, p. 240) mentions a specimen taken along the Labrador coast, but does not record it from Southampton Island. Low (1906) does not list this subspecies. Soper (1928, p. 111) gives us several records from Baffin Island, where it is a migrant, irregularly common in the fall, but apparently does not nest.

Subfamily EMBERIZINÆ.

Genus PASSERCULUS Bonaparte.

62. *Passerculus sandwichensis* subspecies.⁶⁷ SAVANNAH SPARROW.

Eskimo Name: The Eskimos had never seen this species.

Status: An accidental migrant, once recorded on the Island in the spring.

Record: On May 19, 1930, a female Duck Hawk was collected at Itiujuaq. In the stomach of this hawk were the recognizable remains of a Savannah Sparrow, consisting of the bill with part of the skull attached, the feet, most of the wings, and at least one whole rectrix. On the snow not far from the cliff, which the Duck Hawk frequented, additional sparrow feathers were found, probably from the same individual. The sparrow had probably flown northward with the flock of Snow Buntings, which had recently arrived in this region, and was feeding in the bare area along the base of the cliff at the time it was captured. Another accidental migrant was recorded in the same region at the same time, a Slate-colored Junco. There had not been any severe wind from the south and west just prior to May 19, but the weather in general was stormy.

Other Records: Rae apparently did not take a specimen of this species in 1846-47 at Repulse Bay, where it very likely occurs in summer. Preble (1902, p. 120) collected two in juvenal plumage fifty miles south of Cape Eskimo "August 4 to 8," and noted it as "common throughout the region [to the south of Cape Eskimo] wherever suitable ground occurred, especially in the vicinity of the posts."

Taverner (1926, p. 285) states that this species "breeds practically everywhere in Canada, except on the Arctic Islands." Mr. Ford did not remember having seen it on Coats Island or on Southampton. Mr. Swaffield did not take a specimen at Mansel Island. We, however, found it fairly common at Chesterfield, during the late summer of 1930, and there took one immature male specimen on August 27 (1931c, p. 159). It is possible that this species may occur with some regularity along the western shore of Southampton, where in the grassy country not far back from the coast, it may occasionally nest.

Genus JUNCO Wagler.

63. *Junco hyemalis hyemalis* (Linnaeus). SLATE-COLORED JUNCO.

Eskimo Name: Unfamiliar small birds of this sort were called *Adla* or *Adoola* (meaning 'little stranger') by the Eskimos.

Status: An accidental migrant, or straggler, recorded from Southampton Island three times, during the period of the spring migration.

Records: On May 19, 1930, Pumyook shot a much emaciated, but well feathered female Slate-colored Junco with his high-powered rifle at the edge of the floe about six miles west of Native Point. He was hunting seals when he first saw the bird. We had had considerable wind for the three preceding days. It had not been very cold, the thermometer standing at about the freezing-point much of the time during the day. Pumyook told me the Junco was very tame. It was apparently seeking food and shelter in the crevices among the

⁶⁷The race of *sandwichensis* found along the coast of the mainland to the west of Sir Thomas Roe's Welcome is probably *labradorius* Howe. In a letter dated January 7, 1931, Mr. Taverner has written me concerning the distribution of this race: "From a casual inspection I should judge that these northern birds [Savannah Sparrows] are the heavily colored ones we have often noted passing through southern Ontario, etc., in migration. I have noted these a good many times and am inclined to refer them to Howe's *labradorius* which I suspect is a good race and extends right across the north." The summer range of *labradorius*, according to the Committee of the American Ornithologists' Union (1931, p. 334) is Labrador.

roughly piled floe-ice. It was so badly riddled in being shot that I determined its sex with difficulty. Its stomach was empty.

On May 20 during the gale at Itiujak, Tommy Bruce and I saw a Junco several times near our tent in the shelter of the great cliff. We saw it very distinctly, for it came to within a few feet of the tent several times. I could have shot it again and again, but had no auxiliary barrel with me and would have blown it to pieces with a large shell. It had no trace of brown on the back; there were no wing-bars; and I think I can say with certainty that it was a male *J. h. hyemalis* in full breeding-plumage. It finally flew off into the storm, dived into a crevice between some great boulders, and was not seen again. It fed for a time with the Snow Buntings which frequented the cliff.

When Tommy Bruce saw this bird he told me he had caught one "exactly like it" on a schooner near Cape Kendall during the late spring of 1921, just after a storm. He especially recalled the color of the back and head, and the white outer tail-feathers.

Other natives recalled having seen a Junco, or finding one dead. It struck me as remarkable that in one year we should record two individuals of a species of this sort, the migratory route of which is not thought to include, or to pass very near, Southampton. It may be that the spring return of the Juncos, which nest in Alaska, is made for a way northward along the west coast of Hudson Bay, and then westward. Venturesome individuals, which early wander northward and are caught by the storms, may be blown vast distances from Cape Eskimo, or from even farther south, to Southampton.

Other Records: The nearest record for the Slate-colored Junco, which I can find, is that of two birds taken at Fort Churchill by "Dr. Gillespie, Junior," prior to the year 1845, and identified by Clark (1890, p. 322).

Genus SPIZELLA Bonaparte.

Spizella arborea arborea (Wilson). EASTERN TREE SPARROW.

A specimen of Tree Sparrow is said to have been taken at Repulse Bay by Rae, in 1846-47. This specimen is recorded in the British Museum Catalogue of Birds. Preble (1902, p. 122) says that many were "noted on the Barren Grounds, 50 miles south of Cape Eskimo, August 4 to 8." It seems scarcely likely that this bird would occur at Repulse Bay, save as an irregular migrant or straggler; or it may be that Rae's specimen was actually taken farther south along the west coast of Hudson Bay.

Genus CALCARIUS Bechstein.

64. *Calcarius lapponicus lapponicus* (Linnæus). LAPLAND LONGSPUR.

(Plate XIX, figs. 3-4)

Eskimo Name: The Aivilikmiut called this familiar bird the *Kingnituk* or *Kungnituk*. This word may be a modification of *kungenook* (or a near equivalent), meaning black, and, if so, probably calls attention to the black face and throat of the male in spring. It is an unusual name if it thus directly gives the *color* of the bird rather than describing the wearing by the bird of some garment which the color suggests. One of the names for the Snow Bunting, for example, is *Amauligak*, meaning "he wears a cape on his back." *Kungnituk* is very similar to the Baffin Island word *Kungnuktuk* which Soper (1928, p. 115) gives as a name for the American Pipit. The name for the Lapland Longspur in Baffin Island is according to Soper (*Ibid.*, p. 113) *Kowlegak* or *Kaoligak*. Mr. Brandt tells me that in Alaska the Eskimos called the longspur the *Tuk-cho-fluck*.

Status: The Lapland Longspur is an abundant summer resident apparently all over the Island, along the rocky shore of Fox Channel and in the region of Seahorse Point, as well as in the flat country to the west of the Post. It is also found at a considerable distance inland from the coast. Here, on the monotonous tundra, it is often the only species to be seen. It is most abundant in the zone of coastal lakes. I considered it on the whole the most abundant species found on the Island. During the spring the tinkling flight-songs were to be heard almost constantly; nests were found every day during the summer; young birds swarmed about the grassy plains in early fall; and the flocks which gathered for migration often numbered thousands. The Snow Bunting was, on the whole, a rare bird in comparison.

Fall Records: On August 17, 1929, I noted many Lapland Longspurs about the Post just after I landed. They ran about the paths near the storehouse, flitted along between the patches of grass, and gave their characteristic call-notes as they perched on the stones, necks craned high, as they watched me. Most of these birds near the Post appeared to be adults in the post-nuptial moult; but some young birds in the post-juvenile moult were noted, and I saw one or two, which seemed yet to be in complete juvenile plumage. Most longspurs seen at this time had stubby tails; as they flew up they made a good deal of noise with their ill-feathered wings and trailed their feet oddly behind, looking much like young birds learning to fly. On August 19 one of the Eskimo boys brought me an adult male, which was in the midst of the post-nuptial moult. The bird had not had many feathers to start with; and by the time it had been stoned by the boy and inspected and "turned over" by the children, it was indeed a sorry object. On August 20 I collected a female in almost perfect juvenile plumage.

On August 21 great flocks of longspurs were noted in the valley of one of the little streams, which emptied into South Bay not far from the Post. Some Snow Buntings and Pipits were with them. All the birds were restless and rather noisy, and all were moving southward by easy stages, feeding for a time, then flying a hundred yards or more, and so on all day. The flock continued to pass for hours. Whether they were actually migrating, or whether they were merely searching food in a rather methodical fashion, I cannot say.

From August 25 onward longspurs were usually seen in flocks, though individual birds continued to feed about the Post with the easy self-assurance of English Sparrows along the street of a small town.

At Prairie Point on August 25, at Hut Point on August 29, at Cape Low on September 2 and 3, and at Four Rivers on September 4, hundreds of longspurs were seen. The birds were active; they walked or ran about through the grass seeking food, giving hoarse canary-like calls, then leaping into the air to dart away, showing the white edgings of the outer tail, as they made off. Occasionally one of the young birds made a funny attempt to sing.

The principal natural enemy of the Lapland Longspur all through the western part of the Island was the Parasitic Jaeger. On September 3 remains of longspurs were found in the stomachs of three jaegers; and on September 5 another was found in the stomach of a jaeger. Every day I saw the hawk-like *Ishoonguk*⁶⁸ chasing longspurs or shore-birds, and the little birds were caught by the score in the vicinity of our camps. At Four Rivers on September 4 I saw two jaegers pursue and capture a longspur in a chase of fifteen minutes. The longspur might have got away by darting into a hole, or under a stone, had he kept near the ground, but one of the jaegers swooped under him with an exceedingly neat and daring maneuver, nearly dashing itself into a stone, and the longspur was forced upward. The other jaeger came in from the side, turned adroitly, and once more the longspur rose to

⁶⁸The Eskimo name for jaegers in general, the Parasitic Jaeger in particular.

avoid capture. Finally it seemed his only means of escape was to fly higher, ever higher, now to this side, now to that, but always farther and farther away from the grass and moss, where he could crouch and be passed unnoticed. One of the jaegers finally gave the weakening bird a savage bite as it passed, pulling out half the tail-feathers. The longspur after that could not direct his flight very well; with another buffet the victim fell, either dead or exhausted, to the ground. Both jaegers, silent and businesslike, were there to meet it by the time it touched the moss. There was no quarrel over the prey. I had my glass and watched proceedings carefully. One jaeger, standing awkwardly on the small body, wrenched off and swallowed the head. The other bird, not plucking a feather, so far as I could see, gulped down the body without further ceremony.

On the trip to Seahorse Point and return Lapland Longspurs were noted daily until September 26. Thereafter but few were seen anywhere. On October 1 a single bird was seen along the beach searching for food among the short, red grass, not far from the Post. It mounted a stone, chirped once or twice, then flew off far to the westward. On October 10 an immature male in good plumage (a few pin-feathers on the head) was collected at Seal Point. It was feeding among the sea-weed along the beach, in company with two Snow Buntings. It was quite fat. No longspur was seen after October 10.

In view of our acquaintance with this species as a mid-winter visitor in more southerly latitudes, I was surprised at its definite and early disappearance from Southampton in the fall. I had expected that small flocks would linger at least until Christmas, or perhaps through the winter. However, in a region where the food-supply is completely covered with snow, even a hardy species of this sort must seek more southerly regions, if it is to survive the cold weather; so the longspur, like all the other small birds, is distinctly migratory. It departs more definitely, in fact, than the dainty Pipit.

Spring Records: On May 20, 1930, during a snow-storm, which eventually developed into one of the worst blizzards I ever experienced, I saw and collected a male Lapland Longspur at Itiujuaq. The bird was associating with a large flock of Snow Buntings, practically all of which were males. It was fat. The gonads were much enlarged. The stomach and crop held particles of vegetable food and some bits of quartz crystal, but food had evidently been difficult to find. I noted the brightness of the yellow bill, the base and culmen of which had a slight greenish cast. I looked carefully for other longspurs in this flock of buntings, but saw none.

On May 27 an adult male was seen perched on the very edge of the ice, perhaps six miles from land, at the floe west of Native Point. We heard one (perhaps the same individual) from our tent on May 28. On the following day a male was seen at the Post, feeding with the Snow Buntings during a wind-storm. This bird was very weak, probably from starvation, and I nearly caught it in my hands. During the midst of the storm it flew upward, was caught in a blast of wind, was hurled southward, and did not return.

On May 30 I collected a specimen from a flock composed of five longspurs and a few Snow Buntings. All these birds were males. On May 31 a male longspur was seen at the Roman Catholic Mission and another at the Factor's dwelling.

On June 1 large, loose flocks, entirely composed of males, assembled on the bare ground about three miles north of the Post. There must have been two hundred birds in all. I collected seven. The gonads of all were considerably enlarged; and all were fat, but their gizzards were not full of food. The birds worked their way through the short grass diligently, walking for a time, then stopping to look round, only to continue their search. When they came to the edge of a bare patch, they usually flew over the snow to the next

bit of open ground. In some places the tundra had many snowless patches, and here with almost mathematical precision each such patch of open ground harbored its single longspur, which searched carefully over all its chosen space, not neglecting the shadowy spots at the edge of the snow.

The notes of these birds were a rather fine, canary-like *chew-chew*; a *djeer*, which recalled one of the cries of the Baltimore Oriole; and the familiar *ticket-ticket* which is characteristic of the fall season. Sometimes this *ticket*-note was elaborated into a much more complex call, a sort of song.

On June 2 a small flock of males alighted near the Post. On June 5 three males were seen at the mouth of the Koodloutok River; a male was heard singing gayly near the Post; and a flock of ten birds (sex uncertain) was seen flying over.

Data thus far offered prove conclusively that males arrive well in advance of the females, and that courtship and mating therefore take place after the birds have returned to their nesting-grounds. On June 6 the first females were seen, and a male and female were collected. The gonads of both were much swollen. The male, which probably had arrived a week before, was strikingly thin, though in handsome feather; the newly arrived female was fat, though there was little food in her gizzard or crop.

On June 7 hundreds, both males and females, were seen, and the first songs were heard. I collected a female (fat); and one of the Eskimo boys brought in a crippled female, which he had caught.

On June 8 I collected another female and observed the first flight-songs. In the North Country, the program of the individual is virtually that of the species. When one male bird begins to sing, they all begin to sing; by the time one pair mates, all the pairs are mating; when the first egg is laid by one female, all the females of that species are laying the first egg, and so on throughout the length and breadth of the tundra.

The flight-song of the Lapland Longspur was to me the loveliest of Arctic bird-music. The male at this season of love-making seems not to pay much attention to food. He energetically walks through the grass, pecking here and there and doubtless swallowing an occasional seed by force of habit; but the long bright days are chiefly given over to expressing his emotions, to discharging his surplus energy in flight-songs. He leaps from the grass or from a low stone, mounts to a height of twenty or thirty feet, then sets his broadly spread wings, as he begins to sing. Downward he drifts, wings motionless but throat and body quivering as the delicate, many phrased, almost tinkling, song is given. The song is usually (but not always) ended, as Bobolink-wise, he drops to the grass, feet trailing, wings still spread, his every motion expressing the vitality of a healthy small body.

I noted during mid-June that there was, as a rule, no special daily song-period. The birds sang all day long. So abundant were the performing males, that the sky just above the horizon was constantly crossed and recrossed by the little singers, as if a display of rockets were going on. At the height of the mating-season the birds sometimes actually continued their singing until late at night; and the twilight chorus was indescribably lovely. At no time, of course, was the sun visible all night, but during mid-June it never became genuinely dark, and the babel of bird-voices kept up without cessation.

I cannot exactly write down the song of the longspurs. Sometimes I thought I caught a certain rhythm in the whole performance, or the repetition of such Eskimo words as "*Ateeloo, ateeloo, ateeloo*,"⁶⁹ but usually the phrases were, like those of the Bobolink, so broken up that they were exceedingly difficult to imitate.

⁶⁹ Meaning "Again! Again! Again!"—an imperative.

On June 11 I collected two males and two females, the males being much the thinner.

On June 13 I saw a female with blades of dry grass in her bill. I did not, however, find the nest. On June 16 I found two partly completed nests and watched the parent birds for some time. Only the females brought nesting material, but the males remained nearby, standing high on their feet and uttering their sharp notes. The nests were being built in grassy hummocks in swampy places. On June 17 I watched no less than twenty females gathering nesting-material. Nests were found very easily.

On June 21 I found a nest containing four eggs. The female flushed noisily almost underfoot. Her two call-notes were distinctly different. One sounded like "*yur-dah*," the other like "*yee-ee*." She was much agitated.

On June 22 I collected a slightly incubated set of five eggs. The nest was situated in a clump of grass growing in the broad shallow outlet of a lake surrounded by running water three inches deep. On the same date a female was seen building her nest.

From June 23 to July 2 I found, according to my brief notes, from four to twenty nests each day. The species was so abundant and the chosen nesting-sites so restricted to the grassy margins of streams, or to the hummocks of grass in the little marshes, that all I had to do to find nests, was to walk across the tundra in any direction. The females nearly always flushed directly from the nests with an explosive flutter of wings. They did not go trailing off through the grass, dragging their wings or simulating crippledness; nor did they lie on their sides squealing, as if in pain.

All the nests were neatly built of grasses, lined warmly with feathers of ptarmigan, gulls, or smaller birds. Most of them were situated on, or at the side of, a tussock of grass. They were nearly always sheltered to some extent by grass or willow shrubbery, though occasionally they were in the open. About many of the lakes were high, grass-lined embankments, which had been pushed up by action of the frost. These were especially suitable nesting-sites, and often as many as six or eight nests could be found very easily simply by walking about the lake.

I kept an incomplete record of seventy-eight nests found between June 21 and July 17. All but seven of these held, or had held, six eggs. Six held five eggs when the sets were complete; and one for some inexplicable reason held only two. These two eggs, incidentally, were successfully hatched. In fifty-three nests, which were more or less carefully watched, and all of which held sets of six eggs, seventeen sets contained one egg which did not hatch. This, it appears to me, is a considerable percentage of infertility. Of the one hundred and thirty-six nests found during the entire season of 1930, forty-two were destroyed or abandoned for one reason or another.⁷⁰ At least twenty were abandoned because of high water, which in many cases flooded the nests. Many nests were destroyed by dogs. Two at least were broken up by weasels. Three were abandoned before the eggs were deposited.

Owing to the demands various enterprises made upon my time, I did not keep as careful records upon individual nests as I might have. I found, however, that the period of incubation was thirteen or fourteen days. A nest, which contained five eggs on June 21 and a full set of six on June 22, had newly hatched young in it on July 5. The first newly hatched young were found on July 2. From July 2 onward it was unusual to find a nest which contained only eggs. On July 7 only one of over twenty nests I examined held eggs only.

The flight-song of the males ceased with the hatching of the eggs. On July 2 a number of performing males were noted, and the phrases of one song heard were written down as:

⁷⁰ Sets collected by me are not included in this count.

"Clever and pretty indeed you are, but it makes little difference to me." This song was given over and over, with practically no variation. By July 5 almost no songs were to be anywhere heard.

The young birds developed very rapidly. They were fed, so far as I could determine, exclusively on insect-food; and they were fed by both parents. By July 12 nearly all the young birds in nests near the Post were so large, that they crowded each other considerably. On this date I found a nest containing five almost fully fledged young; and outside the nest was an infertile egg, which apparently had been rolled out by the restless young. On July 14 I noted many fully fledged young, with tails almost an inch long. Much to the consternation of the female parent I photographed two (still in the nest). The male did not appear. I think he was off with the rest of the brood, which probably had previously left the nest. On July 17 I found a nest containing six almost fully fledged young at Prairie Point. On July 24 I caught a very thin and weak juvenal male, which had a broken leg and badly injured wing. Many of the young were exceedingly tame. I caught several in my butterfly-net on July 26. By July 28 practically all the young were in full juvenal plumage, with well developed rectrices.

By the time the young were on the wing the parents were in the first stages of the post-nuptial moult. By August 4 all adults I noted were in the midst of this moult.

I was surprised at the number of dead juvenal longspurs, which I continued to find on islands in the salt-water. On August 2 I found two dead young on one of the Tern Islands, where the species had not, so far as I know, nested that season. On August 4 I found *three* more dead birds in full juvenal plumage on the same island, and the Eskimo lad, Paupak, found one near the mouth of the Kirchhoffer River. I do not know what caused the death of these birds.

On August 16, as we were going to meet the *Nascopie*, an individual in full juvenal plumage alighted several times on our motor-boat. It appeared to be exhausted. We were not more than five or six miles from the nearest land at that time, and the weather was not foggy.

The post-juvenal moult begins later in the season than does the post-nuptial moult of the adults; but it is promptly accomplished. Young birds noted at Chesterfield during latter August (in 1930) were in almost complete first winter-plumage. Preble (1902, p. 119) in the Barren Grounds south of Cape Eskimo found the adult birds "moulting and almost invariably destitute of tail-feathers" from August 4 to 13.

Annual Routine: The Lapland Longspur never spends the winter on Southampton Island. It returns early in the spring, the males arriving several days in advance of the females. Flight-songs are not given until the females arrive. Nest-building and incubation is carried on only by the females, but the males assist in feeding the young. The eggs usually number six, but one egg of the set frequently is infertile. The period of incubation is thirteen or fourteen days. The young develop rapidly. The post-nuptial moult begins somewhat earlier than the post-juvenal, but both young and old birds are equipped with new feathers before the sharply cold weather sets in. The fall migration from Southampton apparently is definite, very few individuals lingering as late as the hardier redpolls.

The principal enemy of the longspur is the Parasitic Jaeger. All predatory birds and mammals prey upon it, taking the eggs or young, and capturing the adults principally in early spring, when other food may be scarce or difficult to obtain.

Other Records: Two specimens collected by Rae in 1846-47, at Repulse Bay, are mentioned in the British Museum Catalogue of Birds. Kumlien (1879, p. 77) found it at Cumberland

Sound, but did not see it elsewhere on Baffin Island. Preble (1902, p. 119) found it "abundant on the Barren grounds south of Cape Eskimo August 4 to 13, at which time the old birds were moulting and were almost invariably destitute of tail-feathers." Dr. Bishop tells me that Captain Comer collected a set of four eggs on July 5, 1904, on Southampton Island, and that he included some skins of the species in his shipment to Professor Verrill. Eifrig (1905, p. 241) gives us a full discussion of the species at Fullerton, where it apparently is common. Low (1906, p. 319) says: "Found everywhere along with the Snowflake."⁷¹ Eggs and skins from Fullerton. Nest of grass with few feathers, not hidden."

Mathiassen evidently did not see it in the fall of 1922. Mr. Ford told me he found it common on Coats Island. Soper (1928, p. 115) says: "The Lapland Longspur is a characteristic bird of Baffin Island, but there are large areas, where it is seldom observed. It breeds in large numbers about Nettiing lake, and, presumably, about Amadjuak and Mingo lakes. Mr. Swaffield did not take a specimen at Mansel Island, though it probably nests there. We found it common along the west coast of Hudson Bay during the late summer of 1930 (Sutton, 1931c, p. 159).

Calcarius pictus (Swainson). SMITH'S LONGSPUR.

A specimen of this species said to have been taken by Rae at Repulse Bay in 1846-47, is recorded in the British Museum Catalogue of Birds. The nearest point at which Preble (1902, p. 120) found the species was the mouth of Churchill River.

Genus PLECTROPHENAX Stejneger.

65. *Plectrophenax nivalis nivalis* (Linnaeus). EASTERN SNOW BUNTING.

(Plate XXI, figs. 1-4)

Eskimo Name: The name for this species most frequently heard was *Kopernoak* (*Kopenuak* according to Soper).⁷² It appeared to me that the word *Kopernoak* was used for small birds in general, much as we use the word *songster*. Male Snow Buntings were called also *Amauligak*, meaning "he wears a cape on his back." Almost the same name⁷³ is frequently given to the male Northern Eider, which, it will be remembered, also has a color area on the back resembling a cape, or mantle. Soper (*ref. cit.*) tells us that according to Hantzsch's notes, the female bunting is called *Arnauwiak* in Baffin Island. Mr. Brandt tells me that in Alaska the Eskimos call the species *Con-go-wah*.

Status: A common (locally abundant) summer resident throughout the Island. It is one of the few species, which is equally common in the rough eastern and flat western parts, and also at some distance inland from the coast. It is one of the earliest, indeed sometimes the earliest, of the smaller birds to arrive in the spring and it lingers, at times, late in the fall. It is one of the most pleasing songsters of the Island, and at the Post was decidedly the most familiar and domestic of the dooryard birds.

Fall Records: When I landed at Southampton on August 17, Snow Buntings were to be seen everywhere about the Post. Many of them were in juvenal plumage; others were in the moult. An adult male noted on August 18 had no visible relictrees and the sides of its chest were rich reddish brown. Another male, noted on August 19, was apparently in almost

⁷¹As Soper (1928, p. 115) has pointed out, this is a misstatement. The Snow Bunting is to be found in high country where the longspur often does not occur, at least in summer.

⁷²1928, p. 111.

⁷³*Amaullee* is a name of the male Northern Eider.

complete winter-plumage. On August 23 a female in the post-juvenal moult was collected. The species was numerous all about the Post; but at Prairie Point, across the Inlet, it was comparatively uncommon.

At Four Rivers on August 27, and at Hut Point from August 29 to September 1, buntings were fairly common. At the latter place they frequented the deep, odoriferous beds of seaweed along the shore, where the flocks of shore-birds fed. At Cape Low I saw none on September 2 and only a few on September 3. They were noted daily in fair numbers until mid-September all along the southern shore of the Island west of Coral Inlet.

Family-groups of five to eight birds were seen all about the Post during early September, notably on September 14, when at Poorhouse Hill many such flocks were observed. At Native Point on September 18, great flocks, some of them numbering hundreds of individuals, were seen near the native encampment flying about gaily through the lightly falling snow. While this flocking doubtless foretold of the migration, or was indeed part of the general southward movement, the usual number of family-groups was daily noted wherever we went during the entire month of September. At Leyson Point they frequented a low, crumbling cliff about two miles inland. At Seahorse Point they were seen even in the highest, roughest country. In the gorge of the Anderson River they fed about the talus slopes at the bases of the cliffs. On September 30 at the Post I collected a young male, which evidently had completed the post-juvenal moult. All the birds seen at this time were unaccountably wild.

I collected on October 1 a fat immature female. I secured on October 4 two more immature females (likewise fat) which were in excellent feather. The moult was evidently well over by this date. The birds went about in flocks of fifty to a hundred individuals, searching for food in the grass, or among the boulders along the sides of ridges, wherever there was no snow. Flocks were frequently seen near the Post.

On October 5 seven birds were seen; on October 7 and 8 four were noted near the Post; on October 9 three were observed; on October 10 a male was seen with a solitary Rock Ptarmigan near Seal Point, two were seen feeding among the sea-weed at Seal Point, and a few were noted at the Post. On October 12 two pairs were seen at Seal Point and a single bird was noted at a damp place near one of the inland lakes, where ice had not yet formed. The four birds seen at Seal Point were exceedingly wary. They spent most of their time in the high, coarse grass at the edge of the sandy beaches. Here they were seen *jumping* for seeds which had not yet fallen to the ground. I could not get near them.

On October 14 I secured a male and female at a grassy spot near a frozen stream not far from Seal Point. On October 15 I heard one near the Post. On October 22 (the snow was now deep, covering nearly all the ground) one was seen at the head of South Bay eating seeds along an exposed gravel-bank at the edge of the marine ice. On October 29 Jack Ford and Keetlapik saw three, flying north, at Prairie Point. The birds were calling loudly. None was seen after this date during the fall.

From my comparatively meagre data I should say that the post-nuptial moult is completed by the adults before the post-juvenal is finished in the young; that in migration the adults and young do not band together separately, as is the case with so many shore-birds; that premigratory flocking begins in mid-September and continues until about October 1; that actual departure from the Island takes place in October, only after the heavy snowfalls of early winter have covered the food; and that frequently individuals may linger until November 1, or even later, especially if the season is mild.

The food of the Snow Buntings in the fall was largely seeds. Late in the season the

birds were frequently seen along the beaches strewn with sea-weed, where, no doubt, insects and animal organisms of one sort or another were found.

Spring Records: Only the North Countryman knows how welcome is the cheerful greeting of the little *Amauligak* when it returns in the Spring. The whole world may be white, the sky overcast, and the wind boisterous or cruel; but when the *Amauligak* comes, winter is near its end. All of us, even the fatalistic, phlegmatic Eskimos, found ourselves listening every morning in February for the familiar note of this bird. But *Amauligak's* vital problems are not easily solved, when he returns too early; so he waits until he is sure the drifts are soon to melt. And it often seems that he is a long time in coming.

On March 18 Keetlapik and Kungooaluk saw a few in the region of Salmon Pond (Darkness Lake) thirty miles from the Post. They did not see any between the lake and the Post, as they came in by *komatik*.

On April 9 (temperature 8° F.), four male birds suddenly appeared at the Post in the midst of a snow-storm. I was first to hear the birds and rushed out to look at them. Everyone, including the Eskimos, came out to smile at the fluffy creatures as they loudly called, scratched about the garbage-heap, rested in the shelter of the store-house, and finally found a roosting-place for the night alongside one of the half-buried motor-boats. After the long winter how indescribably beautiful they were!

On April 10 one was seen at noon, and others were heard at various times through the day. On April 11 two were seen in the evening. They alighted on the ridge of the roof of Keetlapik's Mission-house, where, according to Jack Ford, they were accustomed to sleep at night. On April 16 two were heard near the Post. On April 18 the weather became milder and Jack Ford reported to me that he thought he had seen a female bird with a male. On April 20 two, perhaps a male and female, were seen near the flag-pole at the Post. On April 26 two were seen at the edge of the floe near Native Point. On April 30 I saw two at the floe beyond Bear Island.

The birds thus far seen during the season were obviously transient or wandering individuals. They did not remain at the Post. They either were destroyed, retraced their flight to the southward, or moved to other parts. Early dates do not represent the actual arrival of the species, though they do indicate a spring-time urge to return to the nesting-grounds. Apparently the weather has a good deal to do with the arrival of the species *en masse*. On March 30, 1925, according to the official diaries of the Hudson's Bay Company, the first buntings for that season were seen, and the weather was mild, but the species on the whole did not arrive until nearly a month later. During 1926 (according to the diaries) a few buntings were seen on April 6, but the large flocks did not come in until April 18. According to Mr. Ford and the Eskimos the spring of 1930 was unusually severe, marked by late snowfalls and gales, so that our dates of arrival for this season are scarcely average.

A male bird appeared at the Post on May 2, 1930, and appeared "to be at home." He went about, as if he knew every stone and building, spending most of his time about the garbage-heap, where in the high wind he often had trouble keeping his feet. His head was considerably marked with brown, and there was a strong buffy wash on the sides of his chest. The dogs continued to chase this plucky solitary bird for days. On May 5 two more males appeared. On the morning of May 6 several males (perhaps ten in all) were noted. We fed them bread-crumbs and cereals.

By noon of May 6 the wind died down and the sun came out. All at once the Post was alive with buntings, a few females, as well as males. The dreary snow-banks were animated with bright-eyed birds, and the air rustled with the flutter of their wings. I noted four

distinct call-notes on this date: a clear, single, downward note; a double-syllabled twitter; a roughly rolled *djee*; and a peculiar, longspur-like *chick-et*, which one female bird gave again and again. Toward evening I thought I heard a snatch of spring-song in the distance.

From May 7 to 19 buntings were daily seen about the Post, most of them males. The first full song was heard on May 9. Snatches of song, which had a delightfully sparkling and elusive quality, were heard from time to time. On the morning of May 19 I counted forty Snow Buntings about the Post. All but three of these were males.

On May 19 Tommy Bruce and I undertook our memorable trip to Itiujuak, in an attempt to reach the shores of Fox Channel. In the wide snowless fields we found great flocks of Snow Buntings, searching for food in the short grass. There must have been four hundred birds, nearly all of them males, in clean-cut black and white plumage. An amazingly pretty picture they made, as, all heading one way, and all with their white heads down and black backs arrayed in almost military regularity, they moved busily up-wind through the grass. As the rear-guard of the flock caught up with the birds, which lingered at food they had discovered, they rose with a merry chattering to fly over their companions and to settle a rod or so in advance of them. Sometimes this chatter became very noisy, reminding me of the din made by the hordes of Chestnut-collared Longspurs, *Calcarius ornatus* (Townsend), on the Texas prairies. This shifting of place kept up constantly. The birds must have had a good deal of trouble finding enough food to keep alive, for the open spaces were not very large, and the birds went over the ground thoroughly, as they made their way *en masse* through the grass. A few snatches of song were heard on this date. With the buntings were five horned larks, a Lapland Longspur, and a few redpolls.

On May 20 I noted a great deal of variation in the plumage of the males, and collected three males and one female. All were surprisingly fat. The gonads of the males were much enlarged; those of the female were not. The wind had by this time developed into a frightful gale, which threatened not only to destroy all the bird-life, burying all the food under the snow, but even to blow our tent from its pitifully inadequate moorings. The great flock of buntings hunted through the ice-encrusted fields for a while, then gave up their search for food, and made for the shelter of the great cliff, where in the niches of the hundred foot wall of rock they perched cozily, twittering to each other while the storm raged, the snow curling over the rim of rock above them in an endlessly shifting, cloudy sheet. Doubtless the hardy birds found something to eat there, else all of them would have starved. They also roosted there.

At the Post on May 22 and 23, while the gale continued to rage, a flock of Snow Buntings lingered about the snowless patch of gravel surrounding the house. Here, walled-in as they were by drifts of snow almost six feet deep, there was some shelter from the wind, and here we placed food for them.

The birds worked up-wind in the shelter of lumps of snow or pieces of rock. As they fed, the wind caught their wings, or tails, and comically twisted them about, giving them no rest. When they flew up, a gust sometimes caught them and drove them sixty feet into the air, before they could again properly direct their flight downward. They spent some of their time as a thick-set flock on the lee-side of the roof of the store-house. They looked too miserable to be pretty, although their bodies were doubtless kept warm by the deep fluffed-out plumage.

Many of these buntings perished in the storm in spite of our efforts to save them. The dogs caught many. The Eskimo children shot some of them with bows and arrows, or killed them with pebbles. Many doubtless died of starvation or exposure. On May 24 one of the

native boys brought me a handsome male in starving condition. The gonads were much enlarged. The bird soon died.

During late May I noted that buntings were frequenting the bare patches on the top of the ridges, that many of them appeared to be mated, and that the males sometimes sang a little.

Then came the gale of June 3 and 4. Though it was not excessively cold (28° to 30° F.) the wind was unrelenting. Soon a flock of buntings gathered in the snowless areas about the house. The storm was so savage, that even sheltered here, the birds could scarcely keep their feet as they fed. The dogs continued to catch the weaker and less attentive; and, since the wind gave no promise of abating, we all set to work to capture the birds and to bring them inside the house for the duration of the blizzard. A dish-pan propped up on a stick with string attached was "set" for our little friends. Within a few hours we had caught practically the entire flock. We caught from one to five at once, and brought them inside, where, in spite of the red-hot kitchen-stove and the unfamiliar surroundings, they seemed to be quite unalarmed.

I believe the birds were dazed in fighting against the gale. When caught under the dishpan, they set up a peculiarly pitiable cheeping, like tiny chicks lost from the mother hen; but if they saw a ray of light at the edge of the pan they stuck their heads out and proceeded to wriggle and claw around, until very frequently they got out. We used a butterfly-net in getting them from under the dishpan.

The birds, which we did not catch, spent most of their time under the door-steps, the one place about the house which the wind did not reach, and the one place, therefore, which the dogs elected as a napping-place.

The captive birds in the house kept up a constant chirping and peeping. Though they darted about from room to room, they never once crashed into a window-pane, as we expected they might. This, no doubt, was largely because the windows were not as clean as they might have been. They fed upon grape-nuts and corn-flakes. In making their way about they did not hesitate to walk or hop into the dark places under the stove and table, or in my workroom, all through the several shelves. Their call-notes were many and varied. Occasionally male birds would give us strange little snatches of song. One of the call-notes most frequently given reminded me of the mating cry of a toad. Another sounded like "*ches-kit*." There were many musical twitterings and *sotto voce* conversational notes. We liberated these birds on June 6. As I let them go from the upstairs window, one, which had a slightly injured wing, drifted to the ground about three hundred yards away, where it was instantly snapped up by a dog and swallowed, while yet alive. Another, as it wriggled in my hand, suddenly gave a gasp, vomited blood from its throat, and died. Most of the birds were, however, in good condition.

On June 5 I collected a clearly patterned male bird, and noted the first flight-song. This performance, which is merely a variation of the cheerful, sparkling song of the early spring season, is usually given as the bird darts along not far from the ground. From the beginning of the song to its final phrase the wings are held almost motionless high above the back. In this attitude, the bird naturally descends rapidly, sometimes almost to the ground. The song is not nearly so delicate as that of the Lapland Longspur, nor is the whole performance precisely dainty; but it is spirited and dashing, and somehow seems to harmonize with the black and white plumage of the reckless bird as he speeds along.

On June 6 I collected a very thin male. Flight-songs were to be heard on all hands. Females were present in great numbers. Many pairs were mated. On June 7 I collected two

females (fat; gonads enlarged). I heard a male give a song, which reminded me of that of a Savannah Sparrow. A female scolded near the Post in the voice of a House Wren.

On June 8, 9, and 10 all the birds I noted appeared to be mated. On June 12 a female was observed carrying nesting-material to a crevice under an upstairs window at the Factor's house, where these birds had nested for years. This crevice was probably fifteen feet from the ground. It was well sheltered from all sides. Both the male and female spent a good deal of time there while the nest was being built. I could hear them chirping to each other at almost any time of the day. But the female, so far as I could see, brought all the material.

On the same date I noted that the songs of the male birds appeared to have a more definite pattern than they had had at first, and I syllabized one song which had toward its end the *witchity, witchity, witchity* phrases of the song of a yellow-throat (*Geothlypis trichas*).

On June 13 the female, which had a nest in the crevice under the window, set up an outcry everytime I went near the house, passed or opened the window, or went up and down stairs. No egg had been yet laid, nor had the other pairs in the vicinity even begun their nests, so far as I could see. On June 15 I collected a male and a female; the latter had not yet laid any eggs. The female bird at the Post spent much of her time searching for feathers for the lining of her nest. On June 18 the first egg in this nest was laid.

On June 20 I found a well sheltered nest with lining almost finished, under a large flat rock in a pile of stones at Prairie Point. On June 22 I found three nests, one with three eggs, one with two eggs, and one just ready for eggs. All were situated under flat stones. The male of the pair owning the last-named nest sang frequently from the ridge-pole of my tent. When he began his matutinal program it was impossible to sleep. The birds did not make much demonstration when we were near their nests.

On June 23 Mr. Ford found a nest containing three eggs under our house at the Post. It was neatly built, and well concealed; but it was destined to be found by the boys or the dogs. On the following day it was gone. The male of this pair sang a sprightly song which reminded me of that of a wren. On June 24 Father Fafard found a nest in some rocks near the Mission. He took pains to see that no one saw him at the nest, but it was not long before the Eskimo children had found it, and brought both eggs and nest to him. He gave them candy in payment for replacing it.

By this time most of the males were clear white and black, since all the brown and buffy edgings had worn off the plumage. On June 26 I noted that the female bird at the nest under the window spent most of her time incubating, and that the male apparently did not incubate at all. He fed her frequently, however, and spent much time with her at the nest. Sometimes they quarrelled. The female left her nest, whenever anyone came to or opened the window, opened the downstairs door, or went up or down stairs. The male frequently flew about one of the windows, as if he were looking in at us. I later determined that in reality he was catching some sort of small fly.

On June 27 I collected a nest and set of six eggs. All but one of these (infertile, perhaps) had been incubated several days. The nest was situated under a huge stone.

On July 1 I found a new nest, just ready for eggs, under a small flat stone in the open tundra, not far from the Post. I also found another nest (six eggs) on a small rocky ice-bound islet off Seal Point. Another nest (five eggs) was found under a large flat stone.

I noticed that it was very unusual for a female bunting to flush directly from her nest. Sometimes I would see a bird crouching among the stones near me, or even hear it cheeping under the boulders somewhere, and would know a nest was in the vicinity; but I never saw

one fly from under a rock, nor make the slightest attempt at luring me away by broken-wing antics. Very often the male bird would not appear near the nest at all after the female had left it.

The nest found on the rocky islet off Seal Point interested me particularly. On July 2 I returned, hoping to photograph the nest, and, if possible, the female as she settled upon her eggs. This nest was well made of grasses and weed-stalks. The material must all have been gathered from a considerable distance, since there was not a particle of grass on the islet, nor a trace of nesting-material among the rocks. Over the nest was another large, round boulder, which I had to move in order to make any photographs.

I had discovered the nest by watching the female go under the rocks. When I returned, I approached quietly, and watched her slip off. When she first appeared after leaving, she was easily fifteen feet away from the nest. She perched a moment or two on the rocks, then flew away. I removed the stone from above the nest and set up the camera. When she returned, she flew almost directly to the nest, looked at me briefly, then walked away. She stayed in the vicinity, however, and soon came again to the eggs. She was not at all nervous, and she did not scold at my presence. I took several photographs of her as she stood about on the rocks. Finally she settled on her eggs; but, whenever I moved, she stood up and ran off. Once she spied an insect on a rock near my hand and ran over to pick it up. Sometimes she set up a peculiar cheeping when she returned to her nest and noticed that the big stone which had sheltered her was gone. Before I collected this nest I had made several exposures, had fed the mother bird from my hand twice, and had touched her several times. The male bird did not once appear during my sojourn of two hours on the islet. One of my most vivid recollections of this pleasant experience with the mother Snow Bunting is of the way she used her feet in walking or hopping about on the sloping rocks. The soles of the bunting's feet must surely be equipped with the equivalent of adhesive pads to permit of its perching on the slippery, almost vertical rock-surfaces.

On July 2 a native brought in a set of six eggs (well incubated) from Munnimunek Point. On July 6 Amaulik Audlanat's daughter, Ookpik, found a nest containing six eggs near the Post. I observed on July 8 a pair of birds working at a nest, which must have been a second one for the season. Their first nest probably had been destroyed by the dogs. On July 8 the young in the nest under the window were heard calling for food. Since I could not see into this nest without ripping off weather boarding, or the window-sill, I am not certain that the young birds actually hatched on this date, but I think they did. The first egg in this nest was laid on June 18. Since this species lays an egg each day until the set is complete, incubation must have begun on about June 23. If the young hatched on July 8, the period of incubation must have been about fifteen days.

The young birds kept up a continuous outcry nearly all day. They were fed at intervals of two, three, and four minutes, nearly all day. We had opportunity to time the feedings while we, ourselves, were eating meals. The young, when begging for food, made a peculiar *burry*, insect-like cry, which reminded me of the sound made in winding some small, tinny toy.

On July 14 Father Fafard found a nest under a rock, which had temporarily been turned into the den of a weasel. In this nest were the bodies of five nearly full fledged young buntings, all with their heads neatly crushed; on top of these were *sixteen* mice of all sizes, large, fat lemmings, little half-grown lemmings, baby lemmings, a varied, but Macaberesque assortment. All the creatures had been killed by bites in the skull.

On July 17 nine days after the first young hatched, the fully-fledged buntings at the Post left their nest. Four of them for some time sat on the board, which extended above and

outside their nest, begging to be fed. The parents only brought them insects as food, so far as I could see, crane-flies, tiny May-flies, mosquitoes, and so forth. There was an abundance of insect-food everywhere. They were especially fond of a large crane-fly, which the natives called the *Tooktooyok*.

By July 22 many young birds with stubby tails were to be seen flying everywhere about the Post. They continued to beg for food for days. The latest date, upon which I saw young birds just out of the nest, was July 27.

On July 29 an Eskimo lad brought me a neatly plumed juvenal male, which he had killed with a stone. The stomach of this specimen was filled with insects and unhardened seeds. This material had so much green coloring in it, that the entire intestinal tract had a greenish appearance.

On July 30 I found a dead specimen in full juvenal plumage. Adult birds by this time were beginning to lose their frayed, faded nuptial-plumage.

Annual Routine: The Snow Bunting does not winter on Southampton. It is, however, one of the earliest species to return in spring, the males arriving well in advance of the females. The nest is built and the eggs incubated by the female alone. Nests are situated in crevices in cliffs or buildings, under rocks, or piles of rocks, sometimes at a considerable distance from the ground. The eggs are incubated fourteen or fifteen days. The young are fed exclusively upon insect-food. By the time the young leave the nest the adults have begun their post-nuptial moult. The post-juvenal moult is completed rapidly. Pre-migratory flocks are not usually formed until the very eve of departure for the south. Family-flocks are to be seen during most of the fall. Buntings linger throughout October, and even until November, though most of them depart by the last of September.

The natural enemies of this species are the same as those of other small passerine birds. The weasel is perhaps chief among its enemies, owing to its habit of searching about and under the rocks, where the buntings nest.

Other Records: Most of the early explorers noted the snowflake, snow bunting, or "snow buntin" in their journeyings throughout this region. Thus Lyon, on August 29, 1824, found a nest on one of the small islands in Sir Thomas Roe's Welcome. A complete reference to this nest has already been given (see page 7).

Richardson (1825, p. 344) tells us that the species breeds on Melville Peninsula. Rae, who collected a specimen (recorded in the British Museum Catalogue of Birds) at Repulse Bay, probably found it nesting in that region. Swainson and Richardson (1831, p. 246) speak of its breeding about Chesterfield Inlet. Kumlien (1879, p. 67-77) found it generally distributed about Cumberland Sound, Baffin Island.

Preble (1902, p. 119) apparently did not see it in the region of Eskimo Point. Captain John Murray told me that buntings nested between the weather-boarding and inner walls of his home at Cape Low in the spring of 1903. Dr. Bishop tells me that Captain Comer collected several sets of eggs on Southampton Island, one on July 2, 1904 (6 eggs); one on July 4, 1904 (7 eggs); and one on July 5, 1904 (6 eggs). Eifrig (1905, p. 240-241) gives us a full account of the species, as it was noted on the cruise of the *Neptune*. Low's comments (1906, p. 319) on the species are brief.

Mr. Ford told me he found it common on Coats Island. Mathiassen (1931, p. 28) noted it during the last week of August, 1922, at Kûk. Soper (1928, pp. 111-113) found it "the most abundant land bird on Baffin Island." Mr. Swaffield did not take a specimen at Mansel Island where it doubtless occurs. We saw it at Chesterfield and Tavane, along the west coast of Hudson Bay, during the fall of 1930 (Sutton, 1931c, p. 159).

MIGRATION AND LIFE-ZONES

At the end of the short summer nearly all the nesting birds of Southampton move southward to a more hospitable climate. Some of the species, which depart, might endure the low temperatures of winter were they able to find sufficient food; but the snow so covers the ground that vegetation is almost completely buried, the lakes and bays freeze over, and the whole Arctic world becomes so frost-bound, that only very specialized forms find it possible to exist at all.

The prompt fall departure of the passerine birds surprised me. I had expected to find Snow Buntings, Lapland Longspurs, and horned larks all through the fall, and perhaps irregularly throughout the winter. But with the coming of the snows these hardy species disappear just as definitely as do the familiar birds of the Eastern United States, when September frosts begin to be sharp, and the leaves of the maples turn scarlet. The loons and ducks, which live on the lakes, make their way out to the salt-water in late summer. Here they find an abundance of food, as long as the water is open. Since the bays and inlets freeze up much later than the inland lakes, some of the water-fowl linger about the Island until the storms and short days of late October warn of the approach of bitter weather.

The visitor from the south, appalled, as he is, with the long duration and fierceness of the Arctic winter, can but marvel that any sort of bird finds it possible to live on the wind-scoured tundra, when the thermometer stands at thirty below zero for weeks at a time, and when for months the pale sun shows himself so briefly. As a matter of fact there are but few birds, which find it possible to live on Southampton Island the year round. The ptarmigans with their white livery and booted feet seem perfectly at home on the snow-covered plains, be the sun shining brightly or a dreary gale raging. They run about through the drifts with their silken feathers fluffed out and their black eyes glistening. They manage to find enough willow-twigs and buds to keep them alive. Sometimes they have to dig for their food, but their claws are sharp and they seem to have no difficulty in keeping in good condition. Each night they dig for themselves individual beds in the snow.

The great Snowy Owl, his whole body deeply covered with feathers, so that even his beak and claws are scarcely visible, beats back and forth over the tundra, or perches on a prominent ridge-crest, waiting for a lemming to emerge from its burrow. The Northern Raven, naked-footed though he be, circles about the cliffs, making his way up and down the Fox Channel shore, seeking what he can find in the way of offal, or, wanders inland to make a living by stealing bait from the Eskimos' fox-traps.

In the open water of Hudson Bay, sometimes not far from the shores of Southampton Island, other birds live throughout the winter, moving about as the ice moves, feeding upon such crustaceans, molluscs, and other animal food as they can find. Among these are Mandt's Guillemot, the Northern and King Eiders, and occasionally the Brinnich's Murre and Glaucous Gull.

Of all the birds which may be found in winter and summer alike, the Northern Raven comes nearest to being a *sedentary* permanent resident. This bird nests in the high country along Fox Channel, and is also there found in winter. It must wander in search of food, but its home is in the cliffs, and it probably does not need to travel much, if it is so fortunate as to find the carcass of a whale or walrus, upon which it may feed. In the regions where the Barren Ground Caribou is abundant, the raven probably follows the herds, living upon their remains, when killed by wolves.

The Rock and White-shafted Ptarmigans are definitely migratory. I am not in a posi-

tion to assert that the birds, which nest in the southern part of the Island, fly to the southward in winter; but I do know that, when the autumnal snows begin to bury the meadows, great flocks of ptarmigans appear from the north, sometimes in places, where they are not to be seen during the summer. Some of these birds probably nest not far away, but they definitely change their range with the coming of winter. Many travellers in the North Country have seen partridges crossing large bodies of water, flying strongly. The Eskimos have seen them flying southward over the water or ice of Frozen Strait, and across Evans Inlet to Coats Island. Furthermore the winter-range of the birds is usually rather definite. When they find a good feeding-ground, they frequent it all winter.

The Snowy Owl is a sedentary permanent resident, when there is a good supply of lemmings or other food. As a rule, however, he is to a considerable extent migratory, owing to the fluctuation in the numbers of mice, partridges, and other animals, upon which he feeds. During the summer and early fall of 1929 the Snowy Owls were not seen at all in the vicinity of the head of South Bay, where during the following winter and spring they were exceedingly abundant. Lemmings were extraordinarily common all through this section, and the owls moved in more or less permanently, to take advantage of the food-supply as long as it might last.

The wintering water-birds migrate only as necessity for finding open water compels. All these birds dive for their food, and they perish if they cannot find open "leads" or channels. Since the sheet of ice along the southern shore is rarely more than from six to ten miles wide, and since the waters of Fisher Strait, Sir Thomas Roe's Welcome, and Fox Channel are nearly always open enough to furnish feeding-grounds, the eiders and guillemots have but to move gradually outward as the season advances, changing their position as the tide and wind shift the masses of ice about. For all we at present know, the Mandt's Guillemots of South Bay spend the winter but a few miles from their nesting-grounds. They may, however, move considerably to the south, even to the deep waters of Hudson Bay south of Coats Island, while their place is taken by individuals from farther north. Since the waters of Frozen Strait sometimes freeze shut, the birds from this region probably move south to find open water.

Seven species, listed below, may be considered permanent residents of the region of Southampton Island; that is to say, they are represented on the Island, or in the surrounding waters, at all times of the year. Of these only *Corvus corax principalis* is truly a sedentary resident. Three of the species (*) definitely leave the Island proper, because they must find open water in which to rest and feed; three (†) are more or less migratory, depending on the food-supply. *Nyctea nyctea* is sometimes abundant, when lemmings are unusually numerous. *Lagopus lagopus leucopterus* is more definitely migratory throughout most of the Island than is *Lagopus r. rupestris*, though both these species must find good feeding-ground, if they are to spend the winter, and both are known to wander to some extent.

LIST OF BIRDS WHICH ARE PERMANENT RESIDENTS

- **Somateria mollissima borealis*
- **Somateria spectabilis*
- †*Lagopus lagopus leucopterus*
- †*Lagopus rupestris*
- **Cepphus grylle mandt*
- †*Nyctea nyctea*
- Corvus corax principalis*

A preponderant majority of the species, which are recorded during the course of the year, are summer residents, which arrive from the south as soon as the snow has disappeared

from the tundra and the lakes have thawed, and which leave for the South again, as soon as the days begin to shorten and snows to cover the ground. Several of these, whose presence has been noted during the summer season, but whose eggs, nest, or downy young have not yet been found, are indicated by an interrogation mark. While some of the few species now regarded only as migrants, may later be found to be summer residents, the present list of summer birds is probably fairly complete. Some of the following species (designated by an asterisk) have been noted in the late fall or winter, though such winter occurrence is decidedly irregular. One species, *Uria lomvia lomvia*, is thought *not* to nest on Southampton proper, but it may be seen anywhere about the Island during the summer, since it nests not far away on the northeastern end of Coats Island.

LIST OF SPECIES WHICH ARE SUMMER RESIDENTS

<i>Gavia arctica pacifica</i>	<i>Pisobia fuscicollis</i>
<i>Gavia stellata</i>	<i>Pelidna alpina sakhalina</i>
<i>Cygnus columbianus</i>	<i>Ereunetes pusillus</i>
<i>Branta canadensis canadensis</i>	? <i>Limosa haemastica</i>
<i>Branta canadensis leucoparva</i>	? <i>Crocethia alba</i>
<i>Branta canadensis hutchinsi</i>	<i>Phalaropus fulicarius</i>
<i>Branta bernicla hrota</i>	? <i>Lobipes lobatus</i>
<i>Chen hyperborea hyperborea</i>	<i>Stercorarius pomarinus</i>
<i>Chen caerulescens</i>	<i>Stercorarius parasiticus</i>
* <i>Clangula hyemalis</i>	<i>Stercorarius longicaudus</i>
* <i>Archibuteo lagopus s. johannis</i>	* <i>Larus hyperboreus</i>
<i>Falco peregrinus anatum</i>	<i>Larus argentatus smithsonianus</i>
<i>Grus canadensis canadensis</i>	<i>Xema sabini</i>
<i>Charadrius semipalmatus</i>	<i>Sterna paradisaea</i>
<i>Pluvialis dominica dominica</i>	? * <i>Uria lomvia lomvia</i>
<i>Squatrola squatarola</i>	<i>Otocoris alpestris hoyti</i>
<i>Arenaria interpres morinella</i>	<i>Anthus spinoletta rubescens</i>
? <i>Phaeopus hudsonicus</i>	* <i>Acanthis hornemanni exilipes</i>
? <i>Arquatella maritima</i>	<i>Calcarius lapponicus lapponicus</i>
<i>Pisobia melanotos</i>	<i>Plectrophenax nivalis nivalis</i>

By combining the lists of permanent and summer residents we have a total of forty-seven forms which may be considered as nesting species. No species recorded from Southampton is found *only* during the winter months. Some birds doubtless come south into the Island from Melville Peninsula and farther north during winter, but these are all of species which characteristically migrate through, or occur the year round on the Island. The species, which come nearest to being *winter visitants*, are *Falco rusticolus candicans* and *Acanthis hornemanni hornemanni*; but these birds are so rare or irregular, and occur so much more often during the season of migration than in winter, that they are listed with the migrants in the present paper.

The group which for the present must be considered as migrants is not large. Some of these (marked by an asterisk) may occasionally be seen in winter. All of them very likely nest somewhere in the general region, perhaps even in the northern part of Southampton in the region of Duke of York Bay or along the shores of Fox Channel, but they were not found in summer in the southern part of the Island during 1929-1930.

LIST OF SPECIES WHICH ARE MIGRANTS

* <i>Falco rusticolus candicans</i>	* <i>Pagophila alba</i>
<i>Calidris canutus rufus</i>	<i>Otocoris alpestris alpestris</i>
<i>Pisobia bairdi</i>	* <i>Acanthis hornemanni hornemanni</i>
<i>Larus leucopterus</i>	<i>Acanthis linaria rostrata</i>

To the species listed in the above groups may be added the following, all of which have actually been recorded on Southampton or in the surrounding waters, and all of which had

best for the present be considered as irregular migrants, accidental visitants, or stragglers. Some of these (marked by an asterisk) probably are more regular as migrants than our records tend to show, since the present region likely falls within one of their normal migration routes.

LIST OF SPECIES WHICH ARE ACCIDENTAL VISITANTS

* <i>Fulmarus glacialis glacialis</i>	<i>Hylocichla guttata fazoni</i>
* <i>Nyroca marila</i>	<i>Dendroica coronata</i>
* <i>Rissa tridactyla tridactyla</i>	<i>Acanthis linaria linaria</i>
* <i>Alle alle</i>	<i>Passerculus sandwichensis labradorius</i>
* <i>Iridoprocne bicolor</i>	<i>Junco hyemalis hyemalis</i>

To me the smallness of the list of migrants is surprising. A careful survey shows that only two of the seven migrant forms, *Calidris canutus rufus* and *Acanthis h. hornemanni*, have a breeding range, which can scarcely include Southampton. The nearest nesting-ground of the Knot is apparently "southeastern Victoria Island" (American Ornithologists' Union Committee, 1931, p. 117), and that of Hornemann's Redpoll, Greenland (*Ibid.*, p. 325). All the other species may, and probably do, occasionally nest on the Island.

MIGRATION

For some time I entertained the belief that very few non-indigenous birds, that is, individuals which had not themselves nested on the Island, migrate through Southampton, either in spring or fall. One reason for this belief was that I saw so few large migratory flocks of any species, which I thought to be non-resident upon the Island. All the migrant birds seemed to be in small companies, family-groups in fact, which had come down to the beaches from their more inland nesting-territories. Another reason was that, in view of the tendency of migrating land-birds to follow land-masses, when they can do so conveniently, it seemed logical to suppose that birds, which nested on the great islands north of Southampton, should follow migration lines leading southward along the east and west coasts of Hudson Bay, but not across its mouth.

A survey of the general situation convinces me, however, that Southampton lies in an important migration route (for a limited number of species) from Melville and Boothia Peninsulas and adjoining regions southeastward to the Atlantic coast. Most of the Knots, Hudsonian Curlews, American Golden Plovers, Purple Sandpipers, and possibly other species, which nest in Melville and Boothia, very likely pass across the mouth of Hudson Bay *via* Southampton in reaching the Labrador coast or the north shore of the Gulf of Saint Lawrence. Of these species, all but the Knot and Purple Sandpiper also migrate southward along the west coast of Hudson Bay to some extent, whence they pass overland to the Great Lakes or the Atlantic. The migration routes of the common passerine species, which nest to the northward of Southampton, probably do not include the Island.

Some of the summer-resident species, such as the American Golden Plover, which are known to return to their nesting-grounds through the interior, probably pass northward along the west coast of Hudson Bay. The fact that Snow Buntings, Lapland Longspurs, and Hoyt's Horned Larks are seen considerably earlier in the season on the western side of the Island than they are on the eastern side, is fair proof to me that these species move northward along the west coast of the Bay. This is probably not so true of the shore-birds in general, many of which come in from the east across Mansel and Coats Islands, as well as from the west.

My observations in the Chesterfield Inlet region during the late summer of 1930 proved to me that the west coast of Hudson Bay is an important migration route for many shore-

birds. Preble's observations (1902) in the region of Eskimo Point bear out this statement in a striking manner. Many of these birds may be individuals, which have moved eastward to the coast from their more inland nesting-grounds; but others doubtless are birds from farther north, which reach the great feeding-grounds in James Bay *via* the west coast of Hudson Bay. Among the birds seen commonly at Chesterfield are several species, which are very rare or absent at Southampton. Among these are the Northern Phalarope, Baird's Sandpiper, Savannah Sparrow, and Pintail. The abundance of these species is partly due, of course, to slightly different ecological conditions; but it is also an indication that the west coast of the Bay is a migration-route for many birds, which do not pass through or over Southampton *en route* to James Bay.

As to the migratory routes of the more distinctly aquatic species, we have little definite information. Since the Arctic Tern is said to reach its winter-home by passing down the west coast of Europe and Africa, it seems only logical to suppose that it makes its way eastward through Hudson Strait. Many other species probably follow a similar route, unless they move southward into Hudson Bay and thence across land to the Great Lakes and Gulf of Saint Lawrence. The autumnal distribution of the jaegers leads me to suspect that they make their way to the Atlantic by way of Hudson Strait, probably in the wake of the departing terns. The Herring Gull may not swing eastward so much, since it is frequently recorded in the interior. The Sabine's Gulls of Southampton may move both along the Atlantic and through the interior. The Red-throated Loon winters along the Atlantic, so very likely follows the route of Hudson Strait. The movements of the Pacific Loon are not so easy to picture, however, since the winter-home of this species is thought to be in the Pacific Ocean (see A. O. U. Committee, 1931, p. 2). The Little Brown Crane, great traveller that he is, probably pays little attention to water-ways of any sort, and strikes out overland direct for his winter home in Texas and Mexico. All these migratory routes depend in large degree upon the availability of food-supply.

According to my personal observations, many of the great flocks of Lesser Snow and Blue Geese go southward from Southampton by way of Coats Island and the east coast of Hudson Bay and return by the same route in the spring. According to Rae (1850), however, the White-fronted Goose, a species which has not been recorded on Southampton, includes the country of Repulse Bay in its route of migration. The Lesser Canada and Hutchins's Geese and Brant probably migrate along both coasts of the Bay, to pass farther southward, overland. The Whistling Swan, like the Little Brown Crane, probably goes south by the most direct route. I think it does not attempt to reach the Atlantic coast anywhere north of its winter-home along the Virginia and Carolina coasts.

As has been suggested earlier in the present discussion, temperature probably has very little direct bearing upon the migration of the birds of Southampton. That is, few of them go south in the fall because they are uncomfortably cold. They may detect a diminution in the food-supply, and in some cases, notably among the shore-birds, find it difficult, or impossible, to probe in the frozen mud.

The relation between migration and moult is very interesting. Most adult birds, of course, definitely complete their so-called post-nuptial moult before they go southward. In a few species resident upon the Island, the young birds also complete a post-juvenal moult, before they depart. The Snow Bunting, Lapland Longspur, Hoyt's Horned Lark, Pipit, Hoary Redpoll, and Red-backed Sandpiper belong to this class. In another group of species, the adults undergo a definite post-nuptial moult before they migrate, but the young retain their juvenal plumage presumably until they reach their winter-home. In this group we have all

the geese and swans, the Little Brown Crane, the Herring and Glaucous Gulls, and all the shore-birds, with the exception of the Red-backed, Purple, and White-rumped Sandpipers, and Red Phalarope. In a very few species the moult of the adults is so gradual, that they can hardly be said to have a *definite* post-nuptial moult; and the young birds of these species retain their juvenal plumage until after they have left the region. Among these are the Arctic Tern, Sabine's Gull, Duck Hawk, and Pacific and Red-throated Loons. In a few species the adults perform a complete post-nuptial moult, but the young perform an only partial post-juvenal moult before they leave. Such species are the Purple and White-rumped Sandpipers and the Red Phalarope. One species, the Old-squaw, is so irregular in its moulting, that it is impossible to place it in any of the above groups. Adults of this species may carry their so-called winter-plumage almost throughout the summer, and then again they may be very tardy in moulting the summer-plumage in the fall.

From the standpoint of moulting one of the most interesting birds I encountered was the Red-backed Sandpiper. In this species the manner in which the adult birds rushed through the post-nuptial moult, and the haste with which the young took on, and then almost as hastily lost, their handsome juvenal plumage (which is almost never seen in the United States) was amazing to me, especially in view of its noticeable variance from the usually deliberate procedure among shore-birds.

In most species aside from the shore-birds, the adult and young birds migrate southward together. Such birds as the geese depart even in family-groups. The terns leave while the young are still noisily begging for food. The larger gulls, jaegers, and hawks perform more or less solitary migrations in this latitude, depending on the food-supply. Family-groups of ptarmigans wander about together probably all winter. Among the shore-birds, however, the adults nearly always leave well in advance of the young, sometimes two or three weeks earlier. Adult Semipalmated Sandpipers disappear while the young are just learning to fly; where they go, how they finish their post-nuptial moult, and so on, I cannot say from personal observation. The Red-backed Sandpiper performs at least most of the post-nuptial moult on the Island; birds with ragged-edged primaries are to be seen all through July. Not so with the Semipalmated Sandpiper. This little bird's mid-summer program is not nearly so obvious. It may be that such species, which are not seen while in the moult, congregate at some favorite feeding-ground and remain there until they are ready to go southward.

It has always appeared obvious to me that birds which undertake any considerable migration must be in perfect wing-feather. The facts of the situation on Southampton lead me to believe, however, that some of these shore-birds actually begin their migration while they are in the moult. They may move southward deliberately, taking no great non-stop flights, some of them passing over to Coats Island, others to the west coast of Hudson Bay. There is no reason that birds which are moulting their body-plumage should not migrate, since this moult ought not to impair their powers of flight. Thus the young White-rumped and Purple Sandpipers and Red Phalaropes, lingering as they do until very late in the season, may move southward while their first winter body-plumage is coming in. Their juvenal wing-feathers, of course, are fully grown.

The earlier stages of the southward migration are undertaken as a rule in family-groups. Young shore-birds go about together in bands of three and four, obviously brothers and sisters of one brood. These groups finally merge into larger flocks, as the season progresses. The fact, that I continued to see so many of these small groups during the fall, led me for some time to believe that most of the migrant birds at Southampton had actually nested there.

I now believe, however, that even such northern nesters as the Knot may move southward during the first stages of the migration in family-groups, which retain their unity for some time.

In many species the males arrive in advance of the females in the spring. These earliest birds sometimes come in flocks, sometimes singly. During 1930 large flocks of male Snow Buntings and Lapland Longspurs arrived in advance of the females. Among the shore-birds it appeared to me that both sexes often arrived together. The earliest northward-moving bands of King and Northern Eiders were nearly always males. After the adult males and females have come, younger birds sometimes arrive in a definite wave. Some of these birds may nest; others may spend the season wandering about in small companies, and perhaps joining the adults, which have just completed their nesting, in an early fall or late summer southward flight. The status of some of the flocks of shore-birds and geese seen in mid-summer is often puzzling. One does not know whether to regard them as sub-adult birds, which have just arrived from the south; or as adults, which have not bred, or whose nests have been destroyed, and which are consequently already on their way south. Since these flocks are to be seen almost throughout the summer season, it is evident that some sort of migration is taking place practically all summer long in the North Country. Certain birds are just arriving from the south, when individuals of the same species are laying eggs or caring for young; later in the season some individuals of this same species are caring for the young, while others are moving south, and so on. The mere identification of a mid-summer White-rumped Sandpiper is easy, but to determine the status of the individual in the scheme of things is quite another matter. He may be a male, which has left domestic duties to his mate and joined with a flock of similarly-minded males, to spend the height of the summer together while performing the moult; he may be a sub-adult, non-nesting bird moving northward on a delayed spring migration; or he may be the same sort of a bird on an early southward migration. The mid-summer program of the shore-birds on the whole is an involved matter.

LIFE-ZONES

Geographically Southampton Island is not within the Arctic Zone. Zoögeographically, however, it is distinctly within the Arctic Life-Zone. For the most part the region is typical Barren Grounds. The treeless horizon, the mid-summer snow-banks, and the ice-pan-studded bays all attest its boreal affinities. The nesting birds and the mammals are decidedly characteristic of this faunal area. Southampton is a land of Polar Bears, Barren Ground Caribou, Arctic Foxes, Arctic Hares, and other far-northern creatures. Reference to the list of summer-resident birds shows how boreal all these species are.

Southampton's Flora is distinctly Arctic. In the interior there is one valley where willow trees of considerable height have been found. Here the sprawling growth sometimes reaches a height of six or more feet. Elsewhere the shrubs are dwarfed and stunted, growing up as best they can among the rocks, being eaten away by birds and mammals and pruned down relentlessly by the drifting wind. There are many pretty flowers in summer; but these can show their faces but a short time between the snows, and their place is taken by the ubiquitous mosses, lichens, and dull-colored epiphytes.

Among all the summer-birds of the Island there is but one regularly recorded species, the Rough-legged Hawk, which is generally considered representative of the more southerly Hudsonian Life-Zone. The presence of this bird here is due to two major facts, as I think. First, the bird is common on the mainland to the westward, where more southerly con-

ditions are known to exist in the same latitude, and it is an easy matter for a strong flying and wandering species of this sort to come over the water and establish itself in a place which furnishes an abundant food-supply. Second, the cliff-country of the eastern part of the Island furnishes an admirably isolated summer-home for the bird, where there is abundant food, and where there are nesting-sites on every hand. I see no reason that the Rough-leg should not, in time, become just as characteristic of the Arctic as of the Hudsonian Life-Zone. Perhaps in fact it may be one of the species, which is gradually extending its range northward, as it finds summer conditions favorable in treeless country. The occasional presence of this species in mid-winter is additional evidence that it is potentially just as Arctic a species, as is its snowy-colored cousin, the White Gyrfalcon, and for all I know, the booted tarsi may be further evidence that the bird should be considered a more northern species than thus far it has been thought to be.

In considering Life-Zones it is well to remember that the factors which determine these so-called faunal areas are many and varied, and that those which might at first thought seem to be of greatest importance in determining the boundaries of a given Life-Zone, may upon further study prove to be more or less incidental. Thus temperature might at first thought seem to be a very important factor. In studying the matter thoroughly, however, it will be seen that temperature, of itself, does not determine the boundaries of the Arctic Life-Zone, so much as does temperature *combined with* the force and direction of the prevailing winds, the degree of exposure of the region, the amount of rain-fall and snow-fall, and the availability of food-supply. As has been stated before, there is one sheltered valley on Southampton, where the winds so rarely penetrate, that willow-trees sometimes grow to the amazing height of six feet. Snow may bury these trees in the winter, but so long as the winds do not reach them to trim them down, they persist and grow. Were such a valley to become extensively enough vegetated, certain birds of the Hudsonian Life-Zone (the Gray-cheeked Thrush, for example) might conceivably establish themselves there in the very midst of Arctic surroundings. The big Canada Goose, or Honker, has been known to nest on Southampton, though this bird is not of Arctic affinities. It is my belief that such birds as this are sometimes blown across to the Island by a storm, and they are hardy enough to persist and to rear their young, and perhaps even to return, if their nesting operations have been successful.

The character of the bird-life on the mainland west of Southampton is different enough in some respects to make us realize how little latitude may have to do with a problem of this sort. In the Chesterfield Inlet section, the Savannah Sparrow and Pintail Duck are fairly common birds. These more southern species are found at Southampton only as stragglers. Islands, surrounded as they are with water, sometimes have more equable weather than mainland in the same latitude. In the present case, however, the waters about the Island are frequently ice-laden, even in mid-summer, and this ice lowers the temperature not only of the water, but of the atmosphere. This was evident to me during late June and early July, when the wind changed. When the wind blew overland, straight from the north, for instance, the day was balmy and pleasant, and the mosquitoes were sometimes bothersome. When the wind changed to the west, however, so that the air from above the ice-packed inlets was blown over the region, the day immediately became cool, though the sun continued to shine, and the mosquitoes dropped to cover.

The Labrador current, distant though its main stream may be, probably has a chilling effect on this whole region. The snow-banks and glacier-like packs of snow, which never disappear, even in summer, from the rough valleys of Southampton, furnish evidence of the low

average temperature of the region and at the same time have their own part in keeping the air cool. The region to the west of Southampton, lying, as it does, at the edge of a considerable land-mass, is warmed, rather than chilled, by the prevailing winds, which sweep down from the northwest in summer, and this doubtless influences the character of the plant- and animal-life to a considerable extent.

PROBLEMS OF BIRD-LIFE ON SOUTHAMPTON ISLAND

Food

The underlying purpose of every individual bird is simply to keep itself alive. This instinct for self-preservation appears to me to have two phases: there is the desire of the individual (however unconscious of it the bird may be) to keep strong, healthy, and happy, if we may use the latter word, through eating proper food, flying about, drinking, and bathing; and there is the deep-rooted desire of the same individual to continue existence beyond the short span of its own life-time, by reproducing its kind. The phases of the instinct to preserve self and the race are so closely allied, that it is impossible to disassociate them. We watch a Snow Bunting searching for seeds among the late summer-grasses. He eats busily; he stops to preen his newly developing winter-plumage; he drinks; he flies about with his companions apparently for the pleasure he experiences in exercising his wings. A Parasitic Jaeger dashes by, and the bunting crouches in fear of his ancient foe. Once the shadow of the dark wings has fled, the bunting resumes his gay, active life, as if his world held no terror for him. It is easy for us to believe, as we watch the bunting (and the jaeger, too, for that matter) that the bird is concerned only with keeping himself comfortable; yet our thoughts do not have to go far in coming to the conclusion that all this desire for personal, individual comfort is in reality a desire for the preservation of the race; for within a few months that same bunting will have flown hundreds of miles to the southward; will have weathered savage gales; will have crossed bodies of black, cold water; will have sprung from foxes and dashed to cover from hawks; only to return once more to Southampton to devote his summer to bringing forth a brood of young. The bunting is not, we suppose, aware of this racial program in which he figures; but he plays his part well, keeping himself in good health, performing his migrations, courting and mating, all in his blithesome, anything but self-conscious way, saving himself that he may continue to live and at the same time somehow realizing that the life of his race depends upon his own.

So closely related, then, are the bird's immediate interest in self-preservation and the underlying instinct for race-preservation that it is all but impossible to treat of them separately. Furthermore, when we perceive that every activity of a bird and every feature of its internal and external structure are somehow related just as vitally to the reproducing of young, as to the living of an individual existence, it is scarcely possible to think that a bird has any other fundamental problem than that of reproduction. The ptarmigan is protectively colored, so that it may escape being seen by a gyrfalcon. The gyrfalcon is white so that it will have less trouble in capturing prey during winter. The tern is equipped with strong, slender bill, and water-proof plumage, so that it may dive for fish. The long neck of the swan permits it to eat food from the bottom of ponds without diving, and so on. All these adaptations, and all the vital activities which they involve, are on first thought solutions of individual problems of preservation; on second thought they are just as fundamentally widely differing solutions, or attempts at solutions of problems of racial preservation. The variation among these *solutions* makes it possible for many different sorts of birds to live to-

gether successfully, where they could not, were all to live in the same way and upon the same food.

Whether a bird's underlying instinct is merely to keep himself alive, or whether it is to preserve his race through keeping himself alive, we cannot say. In either case he must have food. And the problem of food for individual or for race is the tremendous, never ceasing problem of life the world over. Storms occasionally work havoc in the most idyllic woodlands; floods sweep over the sunniest meadows; man with his firearms visits the remotest islands; but the problem of the bird in coping with these factors is on the whole simple, when compared with that of finding daily food.

The body temperature of the bird is so high, its activity so great, and its rate of living, therefore, so fiercely rapid, that it needs constant and abundant nourishment. The search for food means moving in the open through a habitat where danger lurks in the shadows or drops from the sky; and it means being abroad in weather of all sorts; but food must be found, whatever the cost. Birds might seek such an island as Southampton as a nesting-ground, because of its remoteness and because relatively few natural enemies there exist. The island would not be habitable, however, were there not an abundance of food. As it is, many species have adopted the island as a summer home; and a few, the Snowy Owl, raven, and Rock and White-shafted Ptarmigans, actually find enough food in winter to remain there through the entire year.

The grassy meadows, shallow lakes, gravel-beaches, and rocky ridges furnish an abundance of food to the summer birds. In the water of the ponds are myriads of the larvæ of mosquitoes upon which many birds feed; there are crane-flies, May-flies, and other diptera; there are ground-beetles and spiders. The inlets abound with crustaceans and small fish upon which loons, gulls, terns, guillemots and other water-birds may feed. There are many sorts of seeds for the redpolls, longspurs, buntings, and horned larks; grass and roots for the geese and cranes; willow-buds and twigs for the ptarmigans; lemmings for the owls, hawks, and Pomarine and Long-tailed Jaegers; and lastly there are many small birds for the falcons and Parasitic Jaegers. The finding of food is, for the most part, rather a simple matter, if the weather is good. Since most of the non-predatory forms are protectively colored, they have but to crouch to escape detection, if they are in the grass. The shore-birds appear to depend for protection chiefly upon keeping together in large flocks. The larger forms of water-birds, the Whistling Swan, Lesser Snow, and Blue Geese, and Little Brown Crane have but to feed in the open and there is little danger of their being surprised by any mammal large enough to prey upon them.

THE ELEMENTS

Among the natural factors, which make the individual problems of each bird more difficult, and which therefore tend to make the problem of racial preservation the more complex, none is more erratic and at times more terrifically devastating, than the elements themselves. Wind, rain, hail, floods, all these buffet and destroy the bird-life of any clime; but violent blizzards, extremely low temperatures, deep snow-falls, thick fogs, these are the special heritage of the Arctic; and these subject the birds of the tundra to vicissitudes, which the creatures of more southerly climates never in the duration of their entire lives are forced to encounter.

Snow may fall on Southampton at any time, in any month of the year; and snow will not only cover the food-supply, but it may completely bury nestfuls of eggs or young birds, or,

indeed, whole roosting flocks of such birds as the ptarmigan. Mid-summer snowfalls are rarely heavy, to be sure; but those which come in late spring are liable to be severe and very destructive, and sometimes they are very deep. Birds in early spring, which find themselves caught by a blizzard, have not only the problem of finding food and shelter: they have the all but unsolvable problem of keeping themselves from being seen by their natural enemies, which, like themselves, are emboldened by their great hunger.

Most birds which have eggs or young will continue to brood during snow-storms and will sometimes remain at their nests so faithfully as to be buried under the snow, where they are suffocated. Were snow-falls never accompanied by wind, they might more often be weathered successfully. At Southampton, however, the snow-falls are frequently accompanied by savage winds, which drive the hard crystals against the tundra with a force sufficiently mortal to make the birds seek shelter, if they are to live at all. Storms of this sort work havoc with the nests of species, which oviposit early. During the latter part of May (May 19 to 23 to be exact), in 1930 we had one such gale; and another at the end of the month. During the first gale the north wind blew without ceasing for almost four days. It was cold, and heavy snow continued to fall, so that by the end of the storm there were drifts from four to ten feet deep along the ridges, and the snow everywhere was noticeably deeper than it had been at any time during the winter. The Eskimo Tommy Bruce and I were at Itiujuk at the time, and we saw the flocks of recently arrived Snow Buntings trying to find enough to eat in the thin grass which protruded from the snow and in the few bare areas along the sheltered side of the cliff. All these buntings were pitifully underweight, and many of them were so weak they could scarcely stand, though they flew gracefully. A Duck Hawk, which I shot, had apparently been living upon them. These buntings spent the day wandering about in close companies, combing the places where there was food of any sort, then retiring to the niches in the cliffs at roosting-time. In hunting for food they always faced the wind. At the Post many Snow Buntings were seen during this gale near the Factor's house. So emaciated were these birds that they could not stand in the wind, but had to seek the shelter of a clump of snow in order to keep from being blown away. There was absolutely no food for them to eat, save what was thrown out to them from the house. We gave them bread and cereal for a time, but finally decided to bring them inside to keep them safe from the dogs.

The gales of latter May buried the nest of a Snowy Owl, which contained five eggs. The mother bird, though faithful to her charges for more than a day, was finally obliged to desert, and I found the eggs buried under icy snow three inches deep. Strangely enough they had not been broken by freezing.

The larger birds are not, as a rule, destroyed by storms as often as are the smaller birds. Herring Gulls, for instance, succeed in capturing lemmings or small birds, even though there is no open water. Ptarmigans, if they are not buried in the drifts, succeed in finding willow-twigs, which they can nip off and swallow. Ravens range widely and find something along the edge of the frozen salt-water, or fly far to some carcass they have located.

Most of the smaller birds do not begin nesting until the mild weather of summer is fairly well assured. It is the larger species, therefore, the nests of which are more likely to suffer as a result of freezing in spring. Eggs will weather some very bitter storms, if only the parent can constantly incubate them, but they will freeze, if they are left unprotected for any considerable time.

The first chill weather of autumn drives most of the smaller, and in fact many larger birds, toward the south. Individuals, which linger, may find it necessary to endure very

severe storms; and late broods of young perish as a result of the cold. During the fall of 1929, I saw several late young Red-throated Loons swimming about in tiny pools of open water, where the rest of their "home lake" was coated with ice thick enough to support a man.

Any cold weather, or any snow, which makes the finding of proper food difficult for the smaller birds, immediately makes it easier for the birds and mammals which prey upon the smaller forms to capture them. At the Post it was noticeable that the dogs, which usually paid little attention to smaller birds, began stalking them and actually capturing them just as soon as they became a little sluggish, as a result of starvation or cold.

I cannot be certain, of course, as to the number of birds killed by the gales of the early spring of 1930, but I think that from possibly three hundred Snow Buntings, which were in a flock at the beginning of the storm, less than half remained at the end, and this in spite of the fact that on the next to the last day we caught all the birds we could and kept them inside the house until the wind died down. Some of the buntings may have flown elsewhere, to be sure, but it is likely they could not have found a better place anywhere on the Island to weather the gale than at the Post itself, and there under the best possible conditions many died of starvation or of freezing, or were eaten by the dogs.

King Eiders and other birds, which frequent the open water at the floe, frequently become lost in storms, when the ice closes in and forces them to fly. The birds appear to dread being caught in the ice, and rise when the shores of their resting-place close in. They wander back and forth until they find open water. If it be very windy, and there is fog or snow, they may wander far inland, become hopelessly lost, and fall exhausted in the snow, where they are sometimes found by the Eskimos. Other birds, such as loons, the Brünnich's Murre, and the Dovekie become similarly confused and wander anywhere in storms. Gulls, it seems, are not disturbed at not finding water, and may settle down on the ice or on an exposed rock and sit out the gale, as best they can. Snowy Owls seek shelter behind the rocks. Ptarmigans run or fly to the leeward of drifts or congregate along the ridges in places, which are sheltered from the wind.

Floods sometimes do damage to bird-life, but they are especially destructive to lemmings. If there is an unusually heavy rain in mid-spring or summer the bottom-lands, where sand-pipers nest, may be flooded and the eggs or young deserted by the parents. Most Arctic birds nest on the ground, of course; but such species as the Long-tailed Jaeger and Snowy Owl characteristically place their nests along ridges, or even in very prominent positions where the drainage is good. Lapland Longspurs, on the other hand, seem to prefer a little islet in a shallow stream as a nesting-site and their nests are frequently flooded. At least twenty Longspur nests, which I discovered during the spring of 1930, were deserted because of flooding. Snow Bunting nests are sometimes similarly destroyed. Not often do the levels of the lakes change sufficiently to much affect the bird-life, though tern-colonies always have been known to be flooded, and loon, Old-squaw, and Northern Eider nests are thus destroyed. Only occasionally is there a wind or tide high enough along some low-lying coast to affect the nesting birds, though doubtless unusual rises of the water-level affect such species as the Semipalmated Plover, Ruddy Turnstone, Snow Bunting, and Old-squaw, which I found sometimes nesting not far above the level of the sea, not far back from the shore.

The occasional crumbling of cliffs as along Devil's Gorge of the Anderson River could affect only such species as the Duck Hawk and Snow Bunting, which occasionally nest among the rocks.

PREDATORY MAMMALS

The principal enemy of bird-life on Southampton which existed before the Eskimo and his dogs came upon the scene, was probably the Arctic Fox. The fox pays little attention to birds, when there are plenty of lemmings, but, if ptarmigan are abundant, it preys upon them also, and when the season of egg-laying is at its height, it finds and destroys many nests in the course of its wanderings. The eggs it may eat on the spot, take to its young, or bury for future use. The Arctic Fox can swim, but does not, apparently, care to do so, if it can avoid it. The island-nesting tendencies of many of the Arctic birds have been evolved, I believe, to outwit the Arctic Fox. The principal reason for the choice of what we call an inaccessible niche on a cliff as a nesting-site for ravens or Duck Hawks is likely that these places cannot be reached by the fox.

During my stay on Southampton I found a good many evidences of destruction of birds and birds' eggs by foxes. At dens I found remains of both White-shafted and Rock Ptarmigans, recently killed; and of Old-squaw and King Eider eggs; in caches I found Northern Eider, King Eider, Sabine's Gull and goose (sp. ?) eggs and remains of Old-squaws, King Eiders, White-shafted Ptarmigan, Lapland Longspurs, Snow Buntings, Ruddy Turnstones, Semipalmated Plovers, and White-rumped Sandpipers. I found nowhere any remains of downy young birds, but these, I suppose, are gulped down whole.

I once spent considerable time in photographing a young Long-tailed Jaeger. In the course of my operations, during which the parent birds screamed and dived at me incessantly, an Arctic Fox appeared at some distance, attracted perhaps by the hue and outcry. The jaegers, upon seeing the fox, immediately left me, redoubled their efforts at screaming, and dived at the fox maliciously, driving him out of the country. They must have chased him fully a mile. I take it that the jaegers regarded the fox as an ancient enemy, evidently more to be feared than myself, even though I was actually standing almost over their offspring.

Arctic Terns and Sabine's Gulls raised similar outcries over foxes, whenever they appeared near the islands upon which they were nesting.

Tommy Bruce told me that foxes greatly persecuted the nesting colony of geese at Cape Kendall, being especially destructive to the eggs. I do not doubt that at times of storm or mid-summer snow-fall the foxes capture a good many of the adult flightless geese.

Many nests, which I found not far from the Post at South Bay, were destroyed by foxes; so many in fact, that I began blaming the animals with a tremendous amount of destruction. I now believe, however, that these animals followed my trails, at first through curiosity, and by degrees learned that they found food whenever they followed this trail. The dogs at the Post had the same very disagreeable habit.

The Arctic Wolf doubtless captures birds and destroys eggs or young, as does also the Polar Bear upon occasion. But these large carnivores do not usually pay much attention to birds. I never found any evidence that either a wolf or bear had killed a bird of any sort, though I did see a bear at Seahorse Point strike at a gull, which flew low over the carcass of a seal the bear had just killed.

Neither seals nor walruses, so far as I have been able to find, ever attempt to capture a bird.

The weasel catches some birds, but it doubtless preys almost exclusively upon lemmings, when these are abundant. The belief was prevalent at Southampton that the diminutive weasel may, upon occasion, kill prey even as large as a caribou. Just whence this report

sprang, it is not possible to say, though it is widely known that weasels may attack and kill mammals and birds far heavier than itself.

I saw a weasel trail among ptarmigan tracks upon several occasions, but never saw the remains of a "partridge" which I knew had been killed by one. During mid-summer Father Thibert, however, did find the den of a weasel in which were the remains of sixteen mice and of six young Snow Buntings, one of which had been partly eaten.

PREDATORY BIRDS

All in all, the jaegers are the worst enemy of bird-life among the predatory birds. The Parasitic Jaeger, in particular, is an enemy of longspurs and buntings, and the smaller shore-birds wherever they are abundant. The Long-tailed Jaeger does not, so far as I have been able to determine, take any birds. The Pomarine Jaeger is primarily a mouse-eater. The Parasitic Jaeger at least on Southampton Island is truly an *avivore*.

The hawk-like physical characteristics and propensities of the jaegers are exceedingly interesting. The wings are long, narrow, and strong; the plumage is firmer than in most gulls; the bills are strong and hooked; the tails are adapted for quick turning; and the female bird, as is the case in the hawk-tribe, is larger than the male. Even the cries and call-notes, facial expression, and manner of feeding are decidedly more hawk-like than in the gull family at large. The Parasitic Jaeger in particular is armed with a speed, strength, and appetite, which makes it a formidable foe of the smaller birds.

At Cape Low I saw two Parasitics pursue and finally kill a fully developed young Black-bellied Plover. At another point I took the entire body of a Red Phalarope from a female Parasitic Jaeger's stomach; the victim had been swallowed whole. Again and again I saw these "hunters" chase and capture longspurs, horned larks, buntings, and shore-birds. More than once I fired my shotgun, so as to help the little bird to reach a place of safety. The stomachs of many Parasitic Jaegers, which I examined, contained remains of two or more smaller birds. Since this species is common and widely distributed, I consider it on the whole the worst natural enemy of the small bird-life of Southampton. I believe it kills more of the smaller birds than do all their other natural enemies combined.

The Duck Hawk, wherever it occurs, is of course a confirmed destroyer of birds. It preys particularly upon shore-birds and is quick to perceive and pursue any individual, which lags behind the flock, or which exhibits any physical defect whatsoever. The White Gyrfalcon is so rare that it does not affect bird-life to any extent. At the Post I rarely saw it chase any birds whatever; stomachs of two specimens killed held remains of small birds; and at Seahorse Point certain Eskimos found remains of Dovekies, murre, gulls, and guillemots which had been killed by the gyrfalcons. The Rough-legged Hawk lives chiefly upon mice.

The Snowy Owl occasionally captures ptarmigans and ducks of one sort or another, but as a rule pays little attention to birds.

Ravens doubtless rob nests of both eggs and young birds at Southampton, just as they do elsewhere; but the raven is very local on the Island, so does not greatly affect the bird-life in general. Muckik once saw a White Gyrfalcon pursuing a raven as if trying to kill it.

The Herring Gull and perhaps the Glaucous Gull may at times prove to be the enemies of birds, especially of the geese and ducks, the eggs of which they take. Again and again I found nests, which had been destroyed by gulls, and upon several occasions saw the gulls searching over the ground for nests, after they had seen an incubating parent leave. Often,

after I had found a nest myself and was standing nearby waiting for the return of the parent, the gulls would drift over looking for the nest, and sometimes they were so intent upon a robbery, that I had to shoot at them to frighten them away. The species most constantly preyed upon by the gulls were the Northern and King Eiders, the Old-squaws, and the little Hutchins's Goose.

MAN

The Eskimo has always taken a considerable toll of bird-life. The extinct Saglernmiut, as elsewhere noted, used birds in a good many ways. The present day Aivilikmiut and Okomiut do not as a rule pay much attention to birds themselves; but every spring and summer they spend much time hunting for eggs, and they find and eat a great many of them. So numerous are the geese at Cape Kendall that the natives try to visit this region every year; they always get enough to live on while there, and they bring back box- or trunk-loads of them to trade at the Post, or to eat while they are walrus-hunting.

The most serious inroad the Eskimo makes upon the bird-life is not, however, that which has to do with his food-problems; it is the destruction of birds for "fun," or sport. Now that every hunter has his own rifle, he plans to kill something every time he fares forth; and, if he does not kill a caribou or seal or some other worthy prize, he kills any ptarmigan, gull, or loon he can find. If he brings the bird to camp its carcass may be devoured by the dogs, after it has been crudely skinned. The skin may be used as a towel, or some especially unusual or beautiful part may be saved as an amulet or ornament. However, bird-skins are not used much for ornament on Southampton, and they are never, so far as I know, used for foot-gear. If a gull is killed, the skin is more likely to serve as a gun-rag than as a moccasin, or as part of a "bird-neck rug," such as is made along the east coast of Hudson Bay. The first Rough-legged Hawk which was killed during my stay on the Island, was promptly skinned out for a towel, in spite of the fact that I very badly wanted it as a specimen.

The Eskimos are very fond of the fatty knob at the base of the King Eider's bill, and they not infrequently bite off and eat this portion raw, only to throw the rest of the carcass to the dogs. They like to eat the brightly colored feet of certain species also. Nowadays the bones and sinews of birds are but little used by the Eskimos of the Island.

The attitude of the Eskimo child toward a captive bird amazed me. One might suppose the children would want pets. Not so, apparently. Captive birds are usually maltreated and buffeted about until they die. Every small boy's idea of a good time is to fare forth with bow and arrow, sling and stones, or of late, with a .22 rifle, to hunt Snow Buntings and shore-birds. Every day at the Post the small lads patrol the beaches, throwing pebbles at the sand-pipers; or run about the lakes chasing ducklings, until they kill them or capture them alive. I watched some Eskimos at a colony of terns. At the end of an hour's play, throwing pebbles at the attacking parent-birds, they had killed several.

The Eskimos catch a good many birds with snares placed at the nests. They also catch a good many with steel-traps. They are adept at imitating the cries of most birds and like to lure them close enough for a shot. The species used most for food are the geese and swans. An Eskimo will eat nearly any kind of bird upon occasion; but they are especially fond of a fat *Ookpikjuak* (Snowy Owl); and they will not touch a raven. During the winter they shoot a great many guillemots at the edge of the floe. They slash the birds open, eating the plump breasts raw.

At times the Husky dog is a serious enemy of bird-life. These dogs are well fed during

the winter, when they are expected to work at pulling the *komatik*, but during the summer they are fed practically nothing and they wander along the shore looking for anything edible, or make long journeys inland seeking what lemmings, young birds, and so forth, they can find. At such times they destroy a good deal of bird-life. They incessantly chase the birds which live near the Post. Snow Buntings which tried to nest among rocks or under the Post houses were constantly disturbed by the dogs; one pair finally built their nest under one of the houses and laid a set of six eggs. The very day we found this nest it was destroyed by some of the puppies.

The Husky dog is taught from early puppyhood that he is not to follow trap-lines, and that he is not to run after hunters who go out afoot from camp or from the Post. During summer, however, the dogs at the Post developed the habit of following by night the trails I had made during the day, and they frequently thus found and destroyed many of the nests which I had located and photographed. They destroyed dozens of nests of Snow Buntings, Lapland Longspurs, White-rumped and Semipalmated Sandpipers, and even Snowy Owls in this way, and there was nothing I could do about the matter, for it is impossible to cage the dogs. When the dogs succeed in getting into a colony of nesting birds they may work terrific havoc in a short time.

During the early spring the dogs at the Post caught many of the half-starved Snow Buntings, which came to feed upon crumbs and various cereals which we put out near the house. At such times they crept, or ran up, back of banks of snow, then dashed at the birds, catching them in mid-air in their mouths.

The White Man, wherever he goes, is almost always an enemy of birds. At Southampton, however, the few white men have taken some eggs, no doubt, in the spring; and have shot some ducks and geese for food; but they have wrought no damage to the bird-life in general. They have tried to show the Eskimos the best methods of conserving their own food-supply, and have therefore been the friend alike of man and beast.

The usual eggging and hunting of the Eskimos have not affected the bird-life in general to any great extent; but their selection of camping sites has greatly modified the nesting-range of certain species. Thus their living on Bear Island has completely extirpated the many Arctic Terns, Mandt's Guillemots, Herring Gulls, Northern Eiders, Old-squaws, and Hutchins's Geese, which originally nested there. Mr. Ford himself can remember the time when Bear Island was a famous eggging place. The building of the Post at Coral Inlet has driven out the Whistling Swan, the Lesser Snow Goose, and the Little Brown Crane, within the past six years; and the other larger birds are gradually receding. Mr. Ford told me that the nesting geese and ducks of Prairie Point were much more numerous in 1924 than they are today, and at Cape Low the great colonies of Lesser Snow and Blue Geese either have been killed or have voluntarily moved out, perhaps as a result of the mid-summer invasions of the Eskimos.

Conditions at Walrus Island, in so far as the birds are concerned, have remained about the same, in spite of the annual visits of the natives; and the Tern Islands are still a favorite haunt of the Arctic Tern, Northern Eider, Old-squaw, and Mandt's Guillemot, even though a great many eggs are gathered there every summer.

Much of the destruction of bird-life through egg-gathering might be avoided, were not certain easily accessible colonies so constantly imposed upon. There are near the Post, for instance, certain small islands where terns nest; these are visited so frequently that but few young birds ever develop. In the long run over-use of such colonies means but one thing, extermination.

The student of conservation who deplores the Eskimo's carelessness and short-sightedness will do well to remember, however, that in this inhospitable land there are few delicacies in the way of food; that the barest of livelihood is sometimes very difficult to procure; and that a few eggs come as a welcome variation from the winter's dietary monotony to a people who need and deserve some such refreshment in their lives.

THE FUTURE OF BIRD-LIFE ON SOUTHAMPTON

Two species of birds, which may at one time have lived on or about Southampton Island, are extinct, or virtually extinct today. These are the Labrador Duck and Eskimo Curlew. The extermination of both these species must be laid for the most part to the hand of Man. The Eskimos and Indians of the North Country, however, probably had little to do with this extermination; the chief offenders were the 'sportsmen' and market-hunters of more southern latitudes, who shot the birds in fall, in winter, and in spring.

It is my belief that the Southampton Eskimos will never exterminate any of the birds of their Island, and furthermore, that no species now found on the Island will ever be exterminated, so long as it is not decimated in its winter-range or in migration. The Eskimo is not methodical, businesslike, and efficient enough to shoot out a colony of birds thoroughly. He goes at his egg-gathering in a romantic, desultory manner. He pays little attention, on the whole, to birds as game, and makes no attempt to hoard together great heaps of carcasses for winter consumption. The only boreal species, which are in any danger, are those which are subject to continued persecution throughout the year. Let us consider for a moment the status of the Whistling Swan, now a federally protected bird, both in the United States and Canada. If for some reason the Whistling Swan were to be declared as a game-bird in these two countries, the number of breeding birds returning to Southampton in the spring would be reduced the very first year. Since the swan is large it is regarded as suitable game, when seals are scarce, and the eggs are prized. The inroads made by the Eskimos upon the swans under these circumstances would in time lead inevitably to extermination.

The future of the shore-birds depends almost altogether on the treatment these birds receive in the United States, in Canada, and in South America. The smaller "peeps" will have no trouble in maintaining themselves, for they have never been popular as game; but the Hudsonian Curlew, Hudsonian Godwit, and Golden and Black-bellied Plovers are in danger of becoming extinct, because they are popular as game, wherever they go, save on their nesting-grounds.

The ducks are probably in no danger, first because they are not considered as desirable food by the natives, and second because they live during winter and the migration period in places where relatively little hunting goes on. The geese, on the other hand, are not so fortunate. Not only are they hunted during migration and in their winter home, but the Eskimo gathers their eggs extensively. Such species as the Mandt's Guillemot, which occur throughout the winter and are sometimes killed in considerable numbers at that season, and whose eggs are constantly taken throughout the summer, probably but little more than hold their own, locally. But there are so many remote islands in the North Country, where these birds may breed, that it seems scarcely likely that their present status is threatened.

The small perching birds are in no danger whatsoever, save from sudden widespread blizzards, which might conceivably wipe out thousands of individuals at once. The Eskimo

pays virtually no attention to these birds, though the dogs destroy their nests whenever they find them.

The hunting and trapping activities of the Eskimos have a considerable effect upon-bird-life. The trapping of foxes means the elimination of a certain number of these predators each winter, but it also involves the destruction of a great many Snowy Owls. During the winter of 1929-30, well over a thousand foxes were trapped on Southampton, and judging from the specimens brought in and from the reports of the Eskimos, at least a thousand owls were caught during the same period. Many of these trapped owls were eaten by the foxes and wolves.

The Eskimos kill a great many caribou when they can, for their best winter clothing is made of caribou-skins. The killing of these caribou may sometimes lead to such a reduction in the food-supply of the wolves, that the latter may have to turn to preying on other animals. If the wolves prey extensively upon the Arctic Hares and at the same time a failure of the lemming "crop" develops, the foxes and owls must capture birds, if they are to live in the region at all. It is conceivable too that the killing of a great number of owls during a lemming year might lead to a great influx of other predatory birds such as the jaegers, which would eventually turn upon the bird-life.

The raptorial birds do not capture enough small birds on the whole to affect the status of any species. The Parasitic Jaeger, however, might conceivably become abundant enough at times to threaten certain species with local extermination.

Situated as Southampton is, and inhabited as it is with a wonderful assemblage of wild-life, it would indeed make a glorious Arctic game-preserve. Here might live magnificent herds of caribou, great droves of Atlantic Walruses, hundreds of Polar Bears, and all the birds mentioned in this paper. Such a preserve might be maintained, it seems to me, without removing the Eskimos from the Island. With a little supervision, fox-trapping could be continued. Such really destructive animals as the Arctic Wolf could be controlled to some extent. The Eskimos, intelligent and tractable as they are, might enter into the spirit of such an enterprise with genuine happiness, for they would be proud to assist in keeping the big Island as a home for wild animals, and therefore as a home and hunting-ground for themselves.



Fig. 1



Fig. 2



Fig. 3



Fig. 4

LOONS

FIG. 1. Nest of Red-throated Loon.

FIG. 2. Young Red-throated Loon, just hatched.

FIG. 3. Nest of Pacific Loon: the usual complement of eggs is two.

FIG. 4. Young Pacific Loon, probably two days old.



Fig. 1



Fig. 2



Fig. 3



Fig. 4

GEESE AND SWANS

FIG. 1. Nest of Blue Goose.

FIG. 2. Nest of Whistling Swan: only about one-third of the nest shows in this photograph.

FIG. 3. Nest of Lesser Snow Goose.

FIG. 4. Nest of Northern Eider.



Fig. 1



Fig. 2



Fig. 3



Fig. 4

DUCKS, ETC.

FIG. 1. Nest of Old-Squaw; note the very dark down.

FIG. 2. Nest of King Eider.

FIG. 3. Young Arctic Tern, probably about three days old.

FIG. 4. Nest of American Herring Gull.



Fig. 1



Fig. 2



Fig. 3



Fig. 4

PTARMIGAN; HOYT'S HORNED LARK

FIG. 1. Half-grown Rock Ptarmigan, crouching.

FIG. 2. Rock Ptarmigan feeding near Poorhouse Hill.

FIG. 3. White-shafted Ptarmigan on nest. (Robert C. Stewart photo.)

FIG. 4. Nest of Hoyt's Horned Lark.



Fig. 1



Fig. 2



Fig. 3



Fig. 4

LONG-TAILED JAEGER

FIG. 1. Nest of Long-tailed Jaeger.

FIG. 2. Newly hatched young Long-tailed Jaeger.

FIG. 3. Long-tailed Jaeger, half grown.

FIG. 4. Long-tailed Jaeger in flight.



Fig. 1



Fig. 2



Fig. 3



Fig. 4

SABINE'S GULL

FIG. 1. Nest of Sabine's Gull.

FIG. 2. Newly hatched young of Sabine's Gull.

FIG. 3. Sabine's Gull and small young.

FIG. 4. Sabine's Gull on nest.



Fig. 1

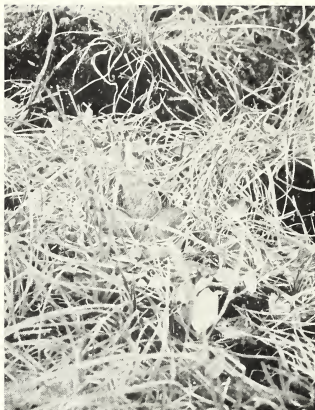


Fig. 2



Fig. 3



Fig. 4

SHORE-BIRDS

FIG. 1. Red Phalaropes feeding at margin of pond.

FIG. 2. Nest of Semipalmated Sandpiper.

FIG. 3. Nest of White-rumped Sandpiper.

FIG. 4. Young Red-backed Sandpiper, probably three or four days old.



Fig. 1



Fig. 2



Fig. 3



Fig. 4

PLOVERS

FIG. 1. Semipalmated Plover on nest.

FIG. 2. Nest of Semipalmated Plover.

FIG. 3. Nest of American Golden Plover: an astonishing example of protective coloration.

FIG. 4. Nest of Black-bellied Plover.



Fig. 1



Fig. 2



Fig. 3



Fig. 4

RUDDY TURNSTONE; LAPLAND LONGSPUR

FIG. 1. Nest of Ruddy Turnstone.

FIG. 2. Newly hatched young Ruddy Turnstone.

FIG. 3. Nest of Lapland Longspur.

FIG. 4. Young Lapland Longspurs, almost ready to leave nest.



Fig. 1



Fig. 2

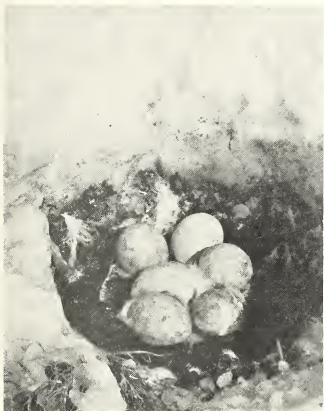


Fig. 3



Fig. 4

SNOWY OWL

FIG. 1. Captive Snowy Owl, ♀, photographed at Ithaca, New York, by Olin Sewall Pettingill, Jr.

FIG. 2. Young Snowy Owls in nest. Note lemming above nest, brought as food.

FIG. 3. Nest of Snowy Owl. Note that eggs are lying in water, and that the nest is completely surrounded by snow. Photographed May 25, 1930, at the head of South Bay.

FIG. 4. Another view of the same nest shown at the left.



Fig. 1



Fig. 2

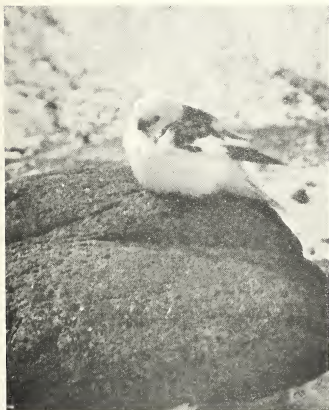


Fig. 3



Fig. 4

SNOW BUNTING

FIG. 1. Nest of Snow Bunting.

FIG. 2. Female Snow Bunting on nest.

FIG. 3. Male Snow Bunting in early spring.

FIG. 4. Juvenal Snow Bunting posed on dog-skin rug. (Photograph by James Thom, of the Hudson's Bay Company)



DOWNY YOUNG OF THIRTEEN SPECIES OF WATER-BIRDS FROM SOUTHAMPTON ISLAND

PAINTED FROM LIFE BY GEORGE MIKSCH SUTTON

1. *Branta c. hutchinsi*, one day old, July 14, 1930. 2. *Charadrius semipalmatus*, one day old, July 14, 1930. 3. *Pisobia fuscicollis*, about two days old, July 12, 1930. 4. *Phalaropus fulicarius*, just hatched, July 23, 1930. 5. *Gavia arctica pacifica*, about two days old, July 17, 1930. 6. *Pelidna alpina sakhalina*, three or four days old, July 14, 1930. 7. *Stercorarius longicaudus*, about two weeks old, August 1, 1930. 8. *Stercorarius longicaudus*, just hatched, July 14, 1930. 9. *Sterna paradisaea*, just hatched. 10. *Sterna paradisaea*, about three days old. 11. *Ereunetes pusillus*, just hatched, July 16, 1930. 12. *Arenaria interpres morinella*, just hatched, July 12, 1930. 13. *Pterodroma dominica dominica*, about one week old, July 28, 1930. 14. *Xema sabini*, probably just hatched, July 17, 1930. 15. *Arenaria interpres morinella*, about four days old, July 16, 1930. 16. *Somateria spectabilis*, probably two or three days old, July 19, 1930.

(All figures .62 natural size)



Fig. 1. Rock Ptarmigan, *Lagopus rupestris rupestris* (Gmelin) at Poorhouse Hill (G. M. Sutton, *pinx*)



Fig. 2. White Gyrfalcon, *Falco rusticolus candicans* Gmelin at head of South Bay (G. M. Sutton, *pinx*)



Fig. 1. American Brant, *Branta bernicla hrota* (Müller) at Prairie Point (G. M. Sutton, pins)



Fig. 2. Blue Goose, *Chen caerulescens* (Linnæus) on tidal flats, Cape Low (G. M. Sutton, pins)

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VOL. XII

PART II, SECTION 3

W. J. HOLLAND, Editor

THE EXPLORATION OF SOUTHAMPTON ISLAND, HUDSON BAY

By GEORGE MIKSCH SUTTON

SPONSORED BY MR. JOHN BONNER SEMPLE

1929-1930

PART II, ZOÖLOGY

SECTION 3. SOME FISHES OF SOUTHAMPTON ISLAND

By ARTHUR W. HENN

PITTSBURGH

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BY ARTHUR W. HENN.

The collection and the study of the birds of Southampton Island having been the main purpose of Mr. Sutton's expedition, and, as it rather fully occupied his time, his collection of fishes was quite small and was only incidentally made. However, all the species, which he brought back to the Carnegie Museum, were new to our collection. They are listed as follows:

Order **ISOSPONDYLI**.

Family **SALMONIDÆ**.

Genus **SALVELINUS** Richardson.

1. **Salvelinus stagnalis** (Fabricius). THE GREENLAND CHARR.

This species was recorded by Dresel (Proc. U. S. N. M., VII, 1884, p. 255) from Godhavn, Disco Island, Greenland, which is in about the same latitude as the northern portion of Southampton Island.

Mr. Sutton brought back a series of adult specimens of the Greenland Charr, which is one of the most interesting freshwater fishes of the region. In the past few years a number of other specimens of this species have been brought from the waters of Greenland by returning Arctic expeditions, but upon these no reports have as yet been published. The Field Museum of Natural History has on exhibit an excellent celluloid cast of this charr in life-colors. Mr. Sutton likewise brought back a sketch in natural colors, but this is not available at the present writing. MacMillan has called attention to the interesting seaward migrations of this charr. The outlets of small inland freshwater lakes in Greenland remain frozen for all the months of the year, except July and August. With the first breaking up of the ice in these streams there is a rush of these fish to these outlets and thence to the sea, from which they must return within two months, or risk being shut out by the freezing of the streams in September. There is apparently an upward migration of the charr from the sea to the lakes just before the outlets again freeze in the fall. Whether these upstream

migrants are the same individuals, which went to sea two months previously, or are individuals, which have wintered in the ocean since the previous summer, is not known.

A single small specimen (G. M. S. No. 1, Carnegie Museum No. 8573a) 160 mm. over all, is provisionally placed in this species. Immature specimens of charrs are always difficult to identify, and, as the formula of the fins agrees, there is no reason to suppose that the specimen under consideration is other than a young specimen of the Greenland Charr, *Salvelinus stagnalis*, although found in a freshwater-lake and seemingly land-locked.

Three fine adult specimens, a male and two females, of this charr occur in the collection. Unfortunately the life-colors are not now distinguishable.

In order to make available the proportions of this species a series of measurements is appended. These are based on a splendid male (C. M. 8572a) with the characteristic hooked mandible, 19.75 in. in total length; and a gravid female (C. M. 8572b) containing eggs about half-developed. The latter specimen measures 18.125 in. over all. The second female measures 15.75 inches. The secondary sexual characters common to all salmonid fishes, namely the longer snout, longer maxillary, and larger adipose fin of the male, are indicated in the measurements.

In this series, the first measurement given is that of the male (C. M. No. 8572a); the second measurement being that of the first female (C. M. No. 8572b).

	MALE	FEMALE
Total length from tip of snout to tip of tail.....	503 mm.	460 mm.
From tip of snout to end of lateral line.....	447 mm.	395 mm.
Least depth of caudal peduncle.....	40 mm.	37 mm.
Length of head from tip of snout to margin of operculum.....	108 mm.	90 mm.
Length of head from tip of snout to nape.....	65 mm.	60 mm.
Perpendicular diameter of head through middle of eye.....	36 mm.	31 mm.
Length of eye.....	13 mm.	12 mm.
Greatest depth of body (approximate) at origin of dorsal.....	105 mm.	105 mm.
Distance from tip of snout to front of eye.....	36 mm.	28 mm.
Distance tip of snout to posterior edge of preopercle.....	85 mm.	80 mm.
Width of interorbital space.....	31 mm.	26 mm.
Distance from tip of snout to posterior end of maxillary.....	60 mm.	44 mm.
Greatest width of maxillary.....	8 mm.	7 mm.
Distance from tip of snout to base of pectoral.....	115 mm.	87 mm.
Distance from tip of snout to ventral fin.....	265 mm.	225 mm.
Length of lower jaw to junction with the quadrate.....	70 mm.	55 mm.
Distance from tip of snout to anal fin.....	345 mm.	320 mm.
Distance (shortest) from tip of snout to origin of dorsal.....	210 mm.	204 mm.
Length of base of dorsal fin.....	43 mm.	38 mm.
Height of longest (fourth) ray of dorsal fin.....	48 mm.	48 mm.
Length of pectoral fin.....	59 mm.	60 mm.
Distance from base of pectoral to base of ventral fin.....	153 mm.	145 mm.
Length of longest upper caudal ray from scaleless base.....	58 mm.	58 mm.
Length of ventral fin.....	51 mm.	49 mm.
Distance from base of ventral to origin of anal.....	105 mm.	102 mm.
Length of longest lower caudal ray.....	58 mm.	58 mm.
Length of base of anal fin.....	34 mm.	33 mm.
Length of middle caudal ray.....	31 mm.	29 mm.
Length of longest (third) ray of anal fin.....	49 mm.	46 mm.
Distance from posterior end of dorsal to adipose fin.....	115 mm.	97 mm.
Length of base of adipose fin.....	9 mm.	7 mm.
Distance from posterior base of adipose to upper base of tail.....	67 mm.	50 mm.
Distance from posterior base of anal to lower base of tail.....	57 mm.	48 mm.
Branchiostegals, number on left side.....	11	10
Branchiostegals, number on right side.....	11	10
Dorsal rays.....	I, 11	I, 11
Anal rays.....	12	10
Pectoral rays.....	13	13
Ventral rays.....	9	9

Order **THORACOSTEI.**Family **GASTEROSTEIDÆ.**Genus **PUNGITIUS** Costa.2. **Pungitius pungitius brachypoda** (Bean).

A single specimen (C. M. No. 8570) 71 mm. in total length. This specimen agrees with the distinctive characters of this form in having short ventral spines, their length being less than one-third that of the head.

D. XI, 10; head 4.3; depth 6; eye 3.3. Dorsal consists of eleven divergent spines, followed by a second dorsal, entirely separate, consisting of ten soft rays. Body smooth, without dermal plates; about eight platelets on each side of caudal peduncle forming a lateral keel.

Order **CATAPHRACTI.**Family **COTTIDÆ.**Genus **ONCOCOTTUS** Gill.

Gill-membranes forming a broad fold across the isthmus, and free from it. Preopercle armed with four spines, partly covered with loose skin; the upper spine longest, straight, projecting upward and slightly backward; the next projecting outward and backward; the third spine projecting slightly downward; and the fourth, or lowest spine, perpendicularly downward.

3. **Oncocottus hexacornis** (Richardson).

Four specimens (C. M. No. 8571a-d) 190-265 mm. in total length, all taken in Coral Inlet, on July 31, 1930.

D. VII-IX, 14-15; A. 13-14; head 3.25. Supraocular and occipital spines replaced by four granular bony ridges, the supraocular ridges curved backward, resembling spines; the occipital ridges broadened and plate-like.

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1929-1930

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SECTION 4. SPIDERS AND INSECTS (IN PART) OF SOUTHAMPTON ISLAND

- I. ARACHNIDA. By C. R. Crosby
- II. DIPTERA. By Charles P. Alexander
- III. CHIRONOMIDÆ. By J. R. Malloch
- IV. HYMENOPTERA. By W. D. McIlroy, Jr.
- V. MALLOPHAGA FROM BIRDS OF SOUTHAMPTON ISLAND. By Harold S. Peters.

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SECTION 4.—SPIDERS AND INSECTS OF SOUTHAMPTON ISLAND

I. SOME ARACHNIDA FROM SOUTHAMPTON ISLAND.

By C. R. CROSBY.

DEPARTMENT OF ENTOMOLOGY, CORNELL UNIVERSITY.

Mr. Sutton in his account of Sabine's Gull (Zoölogy, Pt. II, Sect. 2, p. 186) tells us of securing a specimen of this gull of which "the stomach was *full*, principally of remains of what the natives call snow-spiders." In the footnote 37 (*l.c.*) he says: "These dark colored Arachnids were to be seen moving about on the snow in early spring, especially on warm, bright days."

Among the miscellaneous material representing the invertebrates, which Sutton sent to the Carnegie Museum, were a number of spiders which were referred by the Editor of these Memoirs to me for identification. They represent three species.

Order ARACHNIDA.

SUBORDER ARANEIDA.

Family LINYPHIIDÆ.

Genus ERIGONE Audouin.

1. *Erigone arctica* (White) (?).

Micryphantes arcticus White. Southerland's Journal, 1850, Vol. II, *Appendix*, p. cex, figs. 11-12.

There is one female *Erigone* in the strict sense. It is impossible to determine females in this genus with any degree of certainty. It is almost sure, however, that this is *Erigone arctica* (White).

Family LYCOSIDÆ.

Genus PARDOSA Koch.

2. *Pardosa glacialis* (Thorell).*Lycosa glacialis* Thorell. Öfvers K. Vet. Akad. Förh. Vol. XXIX, 1872, p. 159.*Lycosa modica* Blackwall. Ann. Mag. Nat. Hist., 1846, Vol. XVII, p. 33; Petrunkevitch Index Cat. Amer. Spiders, 1911, p. 573.

Of this species one male and one female have been identified in the material sent home by Mr. Sutton. It is placed by Petrunkevitch under *modica* Blackwall, but I have no great faith in that synonymy. For the present, at least, it seems to me better to leave it in *glacialis*, because we know for certain what Thorell had, and we do not know what Blackwall had.

Genus LYCOSA Latreille.

3. *Lycosa asivak* Emerton.*Lycosa asivak* Emerton. Can. Aret. Exped., 1913-18, Vol. III, 1919, p. 5H.

Of this species Mr. Sutton returned one male and two females. Emerton described this species in 1819 from Bernard Harbour, Dolphin and Union Strait, Northwest Territories. He states that this spider is very common there, and I have no doubt that the specimens from Southampton Island are the same species.

II. DIPTERA COLLECTED ON SOUTHAMPTON ISLAND BY
GEORGE MIKSCH SUTTON.

TRICHO CERIDÆ AND TIPULIDÆ.

By CHARLES P. ALEXANDER.

MASSACHUSETTS STATE COLLEGE, AMHERST, MASSACHUSETTS.

Through the kind interest of Dr. William J. Holland, I have been privileged to study the Crane-flies collected on Southampton Island by Mr. George Miksch Sutton and now preserved in the collection of the Carnegie Museum.

The present report is divided into two divisions, the first of which considers the Crane-flies secured by Mr. Sutton on Southampton Island, the second division being a discussion, with list and bibliography, of the Tipulidæ of the Canadian Arctic.

All types and uniques resulting from the present interesting series of Tipulidæ are preserved in the Carnegie Museum. I wish to express my indebtedness to Drs. Holland and Avinoff, and to Messrs. Kahl and Sutton, for the opportunity of studying this relatively extensive series of Arctic American Tipulidæ.

DIVISION I.

THE TIPULIDÆ AND TRICHO CERIDÆ OF SOUTHAMPTON ISLAND.

Family TRICHO CERIDÆ.

Genus TRICHO CERA Meigen.

1. *Trichocera hiemalis* (de Geer).

1776. *Tipula hiemalis* de Geer; Mém. pour serv. à l'Hist. des Ins., VI: 360, pl. 21, figs. 1-5.

Southampton Island, 1930 (*Sutton*); 5 specimens.

The fly had been previously recorded from Greenland.

Family TIPULIDÆ.

SUBFAMILY TIPULINÆ.

Genus PRIONOCERA Loew.

2. *Prionocera electa* Alexander.

1927. *Prionocera electa* Alexander; Canadian Ent., LIX: 188-189.

Southampton Island, July 3, 1930 (*Sutton*); 1♀.

Described from Hopedale, Labrador (Lat. $55\frac{1}{2}^{\circ}$ N.). The present female differs from the unique type, a male, chiefly in the short-petiolate to nearly sessile cell M_1 of the wings, but certainly appears to represent the same species. The unusually broad and conspicuous obliterative streak before the cord, in conjunction with the infumed outer radial field and short upcurved vein R_2 distinguish the present fly from allied regional species of *Prionocera*.

Genus *NEPHROTOMA* Meigen.3. *Nephrotoma lundbecki* (Nielsen).

1909. *Pachyrrhina lundbecki* Nielsen; Meddelelser om Grønland, XXIX: 390-391.

1919. *Nephrotoma arctica* Alexander; Report Canadian Arctic Exped. 1913-18, Vol. III, part C: 10c-11c.

Southampton Island, box closed August 1, 1930 (*Sutton*); 1♀.

The type of *lundbecki* was from East Greenland, that of *arctica* from the Canadian Northwest Territories. The present station bridges the hitherto extensive gap in the range of the fly.

Genus *TIPULA* Linnæus.4. *Tipula (Vestiplex) arctica* Curtis.

1831. *Tipula arctica* Curtis; Description of the insects brought home by Commander J. Clark Ross. Ross's Voyage to the Arctic regions, *Appendix*, p. lxxvii.

1931. *Tipula (Vestiplex) arctica* Edwards; Ann. Mag. Nat. Hist., (10) VIII: 80.

Southampton Island, July 3, 1930 (*Sutton*); 7, ♂, ♀.

Widely distributed in the Arctic Regions of the New World. (Alexander, 1919, 1925; Curtis, 1831; Henriksen and Lundbeck, 1917; Nielsen, 1907).^{*} Records for Arctic Europe require confirmation.

5. *Tipula difflava* Alexander.

1919. *Tipula difflava* Alexander; Report Canadian Arctic Exped. 1913-18, Vol. III, part C: 12c.

Southampton Island, July 3, 1930 (*Sutton*); 8, ♂, ♀.

Described from the Canadian Northwest and Yukon Territories.

6. *Tipula hollandi* sp. nov., (Plate XXV, figs. 1-5).

General coloration yellowish gray, the præscutum with three clearer gray stripes, which are bordered by brown; a capillary median brown vitta extending the entire length of mesonotum; antennæ black throughout; wings faintly brownish, variegated by dark brown and whitish subhyaline areas; abdominal tergites obscure yellow, with three continuous, longitudinal black stripes; male hypopygium with the caudal margin of tergite with a broad U-shaped notch; basistyle partly fused with sternite; eighth sternite unarmed.

Male: Length, about 12-13 mm.; wing, 13-14.

Frontal prolongation of head about equal in length to remainder of head, light gray; nasus stout; palpi black throughout. Antennæ black throughout, the basal segment pruinose; flagellar segments with the basal enlargement only feebly developed; terminal segment very small; verticils shorter than the segments. Head brownish gray, somewhat clearer gray on front and on the narrow posterior orbits; a scarcely indicated median brown vitta.

Pronotum gray, with a capillary brown median line. Mesonotal præscutum yellowish gray, with three somewhat clearer gray stripes which are bordered by brown lines, these being narrower in the paratype than in the type; a capillary brown vitta extends the entire length of mesonotum; each scutal lobe with two brown areas. Pleura clear gray, the dorso-pleural membrane buffy. Halteres buffy, the knobs darker, tipped with obscure yellow. Legs long and slender; coxæ and trochanters light gray; femora fulvous-yellow, the tips broadly blackened; tibiae and tarsi black; tibial spurs 1- 2- 2; claws very small. Wings

^{*}Dates in parenthesis refer to Bibliography at end of paper.

(Pl. XXV, fig. 1) with the ground-color faintly brownish, variegated with darker brown and whitish subhyaline areas, the darker markings including small spots at origin of *Rs*, end of *Sc* and stigma, the last sending a seam caudad onto the anterior cord; further dark areas in cell *M* on either side of a subhyaline spot and in cell *Cu* before mid-length; the whitish subhyaline areas lie before and beyond the origin of *Rs*, as a narrow, incomplete cross band beyond the cord, as a large, conspicuous spot at near two-thirds the length of cell *M*, and as a common area at near the basal third of cells *Cu* and *1st A*; veins dark brown, *Sc* more yellowish brown. Costal fringe short and dense; macrotrichia of veins beyond cord very sparse, including a series of about a score on distal section of R_{4+5} and a nearly complete series on distal section of Cu_1 ; squama naked. Venation: R_{1+2} complete, with from six to eight macrotrichia on basal half; petiole of cell M_1 , subequal to *m*; *m-cu* at fork of M_{3+4} .

Basal abdominal tergite gray, the succeeding tergites obscure yellow, trivittate with brownish black; sternites obscure yellow, broadly brownish black medially; outer segments, including hypopygium, more uniformly grayish black. Male hypopygium (Pl. XXV, fig. 2) with the tergite entirely separated from the sternite by pale membrane; basistyle not completely separated from the sternite, the sutures indicated on the dorsal, and a little less extensively on the ventral portion; a further small, elongate, roughly triangular area is cut from the sternite adjoining the dorsal sutures. Ninth tergite (Pl. XXV, fig. 3) dark gray, not heavily sclerotized and polished black, as is the case in several Arctic species of *Tipula*; transverse, the caudal margin with a very broad U-shaped notch; caudal third of tergite with very small, delicate setulae, including a marginal fringe. Region of ninth sternite (Pl. XXV, fig. 4) broadly membranous. Eighth sternite unarmed. Outer dististyle (Pl. XXV, fig. 5, od) relatively slender, clavate, narrowed at base. Inner dististyle (Pl. XXV, fig. 5, id) broad, the outer margin wrinkled and provided with numerous erect pale setae.

Habitat: Canadian Arctic.

Holotype: ♂, Southampton Island, July 3, 1930 (*Sutton*).

Paratopotype: ♂.

I take great pleasure in naming this handsome *Tipula* in honor of Dr. William J. Holland. The closest ally appears to be *Tipula subpolaris* Alexander, likewise from the Canadian Arctic. Both species agree in having the antennae uniformly blackened, the tibial spurs long and slender, and with a wing-pattern of somewhat similar appearance. The present fly has the yellow and black abdominal pattern quite distinct, and with the details of the hypopygium very different, the basistyle being partly fused with the sternite, and the notch of the tergite more broadly U-shaped.

7. *Tipula suttoni* sp. nov. (Pl. XXV, figs. 6-10).

General coloration gray, the praescutum with two intermediate brown stripes; antennae black throughout; wings grayish subhyaline, the brown stigma small and relatively ill-defined; *m-cu* connecting with M_4 , some distance beyond the origin of latter; male hypopygium with the lobes of the tergite sooty-black, rounded, separated by a narrow median notch, on ventral surface with a heavily blackened plate that bears four slender spines; outer dististyle buffy-yellow, very broad.

Male: Length, about 9-12 mm.; wing, 10.5-14 mm.

Female: Length, about 13 mm.; wing, 15 mm.

Frontal prolongation of head relatively short and stout, dark gray; nasus stout; palpi black, the basal segments dusted with gray. Antennae relatively short, black throughout, the segments a little pruinose; flagellar segments short, the basal enlargement of each subequal in length to the remainder of segment, the verticils shorter than the segments. Head gray, with a barely indicated capillary median vitta; anterior vertex wide, without tubercle; eyes small; genae with abundant erect setae that are smaller on the posterior vertex, lacking on the median area.

Mesonotum gray, the praescutum with two distinct brown stripes, the lateral pair being

obsolete or nearly so; postnotal mediotergite with a capillary darkened median line. Pleura gray, the dorso-pleural membrane more buffy. Notum and pleura, together with the coxæ, with abundant long setæ, which are chiefly pale in color. Halteres dusky, the base of stem restrictedly pale, the apex of knob more or less yellowish. Legs with the coxæ and trochanters gray; femora reddish brown, passing to black at tips; tibiæ and tarsi black; legs relatively short and stout; tibial spurs 1-2-2; claws with a single small tooth near base. Wings grayish subhyaline; stigma relatively small and ill-defined, brown; oblitative areas extensive, but not conspicuous; veins brown. Costal fringe short and dense; macrotrichia of veins very sparse, including a weak series along the entire length of distal section of R_{4+5} and for almost the whole length of vein 2nd A. Squama naked but with a series of more elongate setæ on margin immediately beyond it. Venation (Pl. XXV, fig. 6): R_{1+2} entirely preserved; $m-cu$ connecting with M_4 shortly beyond base, leaving a short basal section; Cu_2 very pale; cell 2nd A wide.

Abdomen gray, the caudal margins of intermediate tergites narrowly buffy, the lateral margins more broadly so, in some specimens this pale color obsolete or nearly so; outer dististyle of hypopygium buffy; tergal lobes sooty-black. Male hypopygium (Pl. XXV, fig. 7) with the eighth tergite not concealed beneath the seventh. Ninth tergite entirely distinct from the sternite; basistyle partly fused with sternite, the suture indicated both dorsally and ventrally, the fusion being complete on the mid-third. Ninth sternite extensive, with a deep U-shaped median notch, the remainder of the mid-ventral region narrowly membranous; outer dorsal portion of sternite densely set with short, erect setulæ. Ninth tergite (Pl. XXV, fig. 8) entirely blackened above, with two conspicuous lobes, which are separated by a deep median notch; lobes rounded, their dorsal surface densely covered with short setæ; on ventral surface of tergite a narrow blackened sclerotized band, which bears two slender spines on either side, the more lateral pair being directed caudad, the sublateral spines smaller and directed more dorsad. Eighth sternite unarmed. Outer dististyle (Pl. XXV, fig. 9, od) unusually broad and flattened, only a little narrower than long. Inner dististyle heavily blackened, narrow, shaped as shown (Pl. XXV, fig. 9, id).

Habitat: Canadian Arctic.

Holotype: ♂, Southampton Island, July 1930 (Sutton).

Allotopotype: ♀, July 3, 1930.

Paratopotypes: 4 ♂♂, July 3, 1930.

The holotype male is the specimen having the smallest measurements, as given above.

Tipula suttoni is named in honor of the collector, Dr. George Miksch Sutton. In its general appearance, almost uniform gray coloration, unpatterned wings and rather conspicuously hairy body, the species somewhat resembles *T. besselsi* Osten Sacken and allied members of this immediate group, but is very distinct in the details of the male hypopygium.

The female, which I refer to this species as allotype, has an ovipositor of peculiar type (Pl. XXV, fig. 10). The cerci are very thin, non-sclerotized, the apex of each acutely pointed, the margins smooth; hypovalvæ with a dorsal flange-like lobe at base, these valves obtuse at their apices. This type of ovipositor remotely suggests the condition found in the subgenus *Vestiplex* but is quite distinct.

SUBFAMILY LIMONIINÆ.

Tribe Eriopterini.

Genus *HELOBIA* Saint Fargeau.

8. *Helobia hybrida* (Meigen).

1804. *Limonia hybrida* Meigen; Klassificat., 1: 57, pl. 3, fig. 17.

1900. *Helobia hybrida* Coquillett; Proc. Washington Acad. Sci., 2: 399.

Southampton Island (Sutton); 1 ♂, 1 ♀.

The present fly has a vast range throughout the Holarctic region.

DIVISION II.

THE TIPULIDÆ OF ARCTIC AMERICA.

The true Arctic *Tipulidæ* of the World are mostly very similar in their general appearance. This statement is especially true concerning the dominant genus *Tipula*, where several subgenera are involved, yet all species appear at first sight to be much alike. Gray is the predominant color, while shortened legs are very characteristic. Some species of this genus are strikingly pilose but others have a more normal vestiture. Subapterous species are frequent on the Pribilof Islands (Alexander, 1923), but elsewhere in the far north have not been taken in any numbers. Among the characteristic Arctic *Tipulidæ* in the New World may be mentioned: *Prionocera parrii*, *P. parrioides*, *Nephrotoma lundbecki*, *Tipula* (*Vestiplex*) *arctica*, *T. besseloides*, *T. difflava*, *T. hewitti*, *T. hollandi*, *T. johanseni*, *T. suttoni*, *Dactylolabis rhinoptiloides* and *Rhabdomastix* (*Sacandaga*) *caudata*.

A LIST OF THE TIPULIDÆ OF ARCTIC AMERICA.

Areas included: (1) *Alaska*, north of the Arctic Circle but also including the Pribilof Islands. (2) *Canadian Northwest Territories*, north of the Arctic Circle, including all of the District of Franklin (Baffinland and Ellesmereland) but including also Southampton Island and coastal Labrador, as far south as 55° N. Latitude. (3) *Greenland*.

Areas omitted: (1) *Alaska*, south of the Arctic Circle, including the Alaska Peninsula and Aleutian Islands (this omitted area includes numerous *Tipulidæ* from Sitka, described by Bergroth; the Harriman Alaska collections, reported on by Coquillett; the Katmai collections, discussed by Alexander; and other smaller series. These species are not Arctic species, but are more especially Hudsonian and Vancouverian types). (2) *Canadian Northwest Territories*, south of the Arctic Circle, including the Districts of Mackenzie and Keewatin, with the exception of Southampton Island (this omitted area includes numerous high Hudsonian types taken by Bryant, Harper, Kennicott, and others, but with few or no strictly Arctic *Tipulidæ*). (3) *Southern Labrador*. Most of the species of *Tipulidæ* taken by Perrett at Hopedale (Lat. 55½° North) are widely distributed Hudsonian types, but at the same time include a lesser number of apparently true Arctic species. Southern Labrador, Canadian Labrador and Newfoundland have produced no strictly Arctic *Tipulidæ*.

Southampton Island. Despite the fact that it lies south of the Circle, all species of *Tipula* and *Nephrotoma* taken by Mr. Sutton represent characteristic Arctic species. It seems certain that the above artificial and arbitrary boundaries listed above will require much modification as a result of future discoveries.

(The date in parenthesis pertains to the Bibliography).

TIPULINÆ.

- Prionocera electa* Alexander. Labrador; Southampton Island. (Alexander, 1927)
P. parrii (Kirby). Canadian Northwest. (Alexander, 1919)
P. parrioides (Alexander). Canadian Northwest. (Alexander, 1919)
 [*Nephrotoma arctica* Alexander = *N. lundbecki* (Nielsen)]
N. lundbecki (Nielsen). Canadian Northwest; Southampton Island; Greenland (Nielsen, 1907; Alexander, 1919)
Tipula alascensis Alexander. Pribilof Islands. (Alexander, 1923)
T. aleutica Alexander. Pribilof Islands. (Alexander, 1923)
T. aperta Alexander. Labrador. (Alexander, 1918a)

- T. bergrothiana* Alexander. Northern Alaska. (Alexander, 1918a)
T. besselsi Osten Sacken. Canadian Arctic. (Osten Sacken, 1876)
T. besseloides Alexander. Canadian Northwest. (Alexander, 1919)
T. canadensis Loew. Labrador. (Alexander, 1928)
T. coracina Alexander. Northern Alaska. (Alexander, 1918a)
T. difflava Alexander. Canadian Arctic. (Alexander, 1919)
T. entomophthora Alexander. Labrador. (Alexander, 1928)
 [*T. glomerata* Walker = *T. arctica* Curtis]
T. grenfelli Alexander. Labrador. (Alexander, 1928)
T. hewitti Alexander. Canadian Northwest. (Alexander, 1919)
T. hollandi sp. nov. Southampton Island. (this report)
 [*T. imperfecta* Alexander = *T. aperta* Alexander]
T. johanseni Alexander. Canadian Northwest. (Alexander, 1919)
T. kirbyana Alexander. Northern Alaska. (Alexander, 1918b)
 [*T. labradorica* Alexander = *T. platymera* Walker]
T. macrolabis Loew. Labrador. (Alexander, 1928)
 [*T. nodulicornis* Zetterstedt = *T. arctica* Curtis]
T. packardi Alexander. Labrador. (Alexander, 1928)
T. perretti Alexander. Labrador. (Alexander, 1928)
T. platymera Walker. Labrador. (Alexander, 1928)
T. pribilofensis Alexander. Pribilof Islands. (Alexander, 1923)
T. productella Alexander. Labrador. (Alexander, 1928)
T. septentrionalis Loew. Labrador. (Alexander, 1928)
T. sarta Loew. Labrador. (Alexander, 1928)
T. subarctica Alexander. Canadian Northwest. (Alexander, 1919)
T. subpolaris Alexander. Canadian Northwest. (Alexander, 1919)
T. subserta Alexander. Labrador. (Alexander, 1928)
T. suttoni sp. nov. Southampton Island. (this report)
 [*T. tessellata* Loew = *T. platymera* Walker]
T. whitneyi Alexander. Pribilof Islands. (Alexander, 1923)
T. (Nesotipula) pribilovia Alexander. Pribilof Islands. (Alexander, 1921b)
T. (Vestiplex) arctica Curtis. Canadian Arctic; Greenland; Arctic Europe (?). (Alexander, 1919; Curtis, 1831; Nielsen, 1907)

LIMONIINÆ.

LIMONIINI.

- Limonia (Dicranomyia) decora* (Stæger). Canadian Arctic.
L. (D.) hallerata (Osten Sacken). Labrador. (Osten Sacken, 1869)

PEDICINI.

- Tricyphona brevifurcata* Alexander. Canadian Northwest. (Alexander, 1919)
T. glacialis Alexander. Pribilof Islands. (Alexander, 1921b)
T. hannaï Alexander. Pribilof Islands. (Alexander, 1923)

HEXATOMINI.

- Dactylolabis rhinoptiloides* (Alexander). Canadian Northwest; Ellesmere Island; Labrador. (Alexander, 1919, 1924; Johnson, 1929)
Linnophila (Phylidorea) fulvocostalis Coquillett. Bering Island. (Coquillett, 1899)

ERIOPTERINI.

- Chionea waughii* Curran. Labrador. (Curran, 1925)
Neolinnophila ultima (Osten Sacken). Northern Alaska; Canadian Northwest.

- Rhabdomastix (Sacandaga) caudata* (Lundbeck). Baffinland; Greenland. (Alexander, 1914; Lundbeck, 1898)
Helobia hybrida (Meigen). Canadian Northwest; Southampton Island.
Ormosia affinis (Lundbeck). Greenland. (Lundbeck, 1898)
Erioptera (Psiloconopa) angustipennis Alexander. Canadian Northwest. (Alexander, 1919)

Records of a few European species of *Tipulidæ*, which have been recorded for Greenland, apparently in error, are omitted from the above list. Such records include *Limonia (Dicranomyia) modesta* (Wiedemann), *Ormosia fascipennis* (Zetterstedt), *Nephroloma lineata* (Scopoli), and others.

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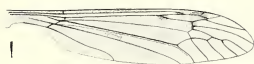
EXPLANATION OF PLATE XXV.

Tipula hollandi sp. nov.

- FIG. 1. Wing. FIG. 2. Male hypopygium, lateral aspect.
FIG. 3. Male hypopygium, 9th tergite; dorsal aspect.
FIG. 4. Male hypopygium, 9th sternite and basistyle, ventral aspect.
FIG. 5. Male hypopygium, inner and outer dististyles.
(Symbols: a, ædeagus; b, basistyle; id, inner dististyle; od, outer dististyle; s, sternite; t, tergite).

Tipula suttoni sp. nov.

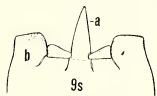
- FIG. 6. Wing-venation. FIG. 7. Male hypopygium, lateral aspect.
FIG. 8. Male hypopygium, 9th tergite, dorsal and ventral aspects.
FIG. 9. Male hypopygium, inner and outer dististyles.
FIG. 10. Ovipositor, lateral aspect.
(Symbols: b, basistyle; id, inner dististyle; od, outer dististyle; s, sternite; t, tergite).



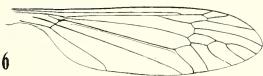
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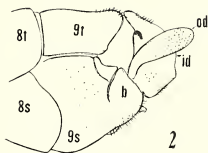
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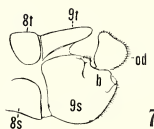
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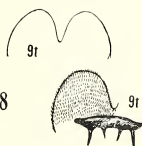
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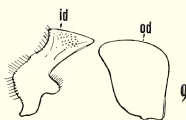
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9

CULICIDÆ.

A NOTE BY ALAN STONE.

At the suggestion of Dr. J. M. Aldrich the *Culicidæ* collected by G. M. Sutton on Southampton Island were sent to Dr. Alan Stone for determination. From him the following was received:

“UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF ENTOMOLOGY
WASHINGTON, D. C.

January 5, 1932

DR. W. J. HOLLAND,
Carnegie Museum:
Pittsburgh, Pa.

MY DEAR DOCTOR HOLLAND:

The fifteen specimens of mosquitoes collected by Mr. George M. Sutton on Southampton Island arrived in good shape. They are all female *Aedes alpinus* (Linn.), a circumpolar species. I am returning 9 of the 15 specimens, retaining the other 6. Thank you for the opportunity to examine these specimens.

Very sincerely yours,

ALAN STONE,
Associate Entomologist.”

III. CHIRONOMIDÆ, SCIARIDÆ, PHORIDÆ, SYRPHIDÆ, PIOPHILIDÆ,
HELOMYZIDÆ, CALLIPHORIDÆ, CESTRIDÆ¹, AND TACHINIDÆ.

By J. R. MALLOCH, U. S. BUREAU OF BIOLOGICAL SURVEY.

SUBORDER NEMATOCERA.

Family CHIRONOMIDÆ.

SUBFAMILY TANYPINÆ.

There are about half a dozen species of this subfamily recorded from Greenland, but in the present collection I find only three.

Genus PROCLADIUS Skuse.

1. *Procladius crassinervis* (Zetterstedt).

Tanypus crassinervis Zetterstedt, Ins. Lapp., p.817 (1840).

A series of specimens of both sexes, only one of which bears a date, July 3.

This species is known to occur in Scandinavia and Britain, and has also been recorded from East and West Greenland by Lundbeck.

Genus ANATOPYNIA Johannsen.

I have before me one male specimen which I have been unable to satisfy myself is a representative of a described species and I give below the description thereof.

2. *Anatopynia centralis*, sp. nov. (fig. 1).

Male: Black, slightly shining. Antennæ including the plumes fuscous. Mesonotum dusted with grey, with four blackish vittæ; scutellum dusted with greyish; hairs fuscous. Abdomen concolorous with thorax, the apices of tergites rather distinctly, their bases indistinctly, testaceous, the grey dusting variable in intensity apically when seen from different angles. Legs fuscous, tibiæ a little paler; hairs dark. Wings greyish hyaline, with a conspicuous fuscous cloud over the cross-veins, and when seen against the light looking downward from tip with a dark cloud over media and cubitus, the latter extending forward to radius from level of apex of second branch of cubitus to near apex of media. Halteres dark brown, whitish at apices.

Antennal flagellum very long plumose. Mesonotum with the usual biseriate central, and more numerous sublateral and lateral, series of hairs. Abdomen typical, the hairs long; hypopygium as shown in Figure 1. Legs long and slender, fore metatarsus about four-sevenths as long as fore tibia and fully 1.5 as long as second segment, first to third segments long-haired, fourth short-haired and about half as long as third and 1.5 as long as fifth segment; fore tibia very short-haired except apically, where the hairs are decumbent and not very long; fore femora not as long-haired as mid and hind pairs, the latter with long erect hairs, their tarsi shorter-haired, fourth segment of mid tarsi not longer than fifth; fore tibia with a single apical ventral spur, mid and hind pairs each with two spurs, the inner



FIG. 1.
Anatopynia centralis,
hypopygium of male,
left side, dorsal view.

¹Inserted by W. J. Holland.

one longer than the outer; hind tarsi without apical spurs on any of the segments; pulvilli lacking. Wings almost without hairs and with the normal venation. Length, 7.5 mm. Type, July 3, 1930.

The hypopygium has been detached and is now mounted on the card with the specimen.

Genus *Pentaneura* Philippi.

I have before me a single female specimen which I refer here.

3. *Pentaneura* sp. ?

A fuscous species with dark legs and unmarked densely haired wings. The second wing vein (R_2) is complete, though rather faint, and is not connected with the first by a cross-vein, which character would place the species in the subfamily *Diamesinae* as defined by Edwards.² The haired wings prevent the species from falling into *Protanypus*, which is the only genus of that group, in which there are fourteen segments to the female antennæ, and as the number of segments to the female antennæ in *Pentaneura* is given as 12-13 it does not fit very well into the present genus either. The pulvilli are lacking, and the other characters appear to suggest that it is a rather aberrant species of the latter genus. Length, 3.5 mm. July 3, 1930.

SUBFAMILY CHIRONOMINÆ.

Until recently the family was divided into two subfamilies, *Tanypinæ* and *Chironominæ*, but the latter has been further divided into *Chironominæ* and *Orthoclaudiinæ* by the most recent workers, and I am accepting this scheme in the present paper.

The principal distinction between the present subfamily and the *Orthoclaudiinæ* consists in the structure of the male hypopygium, which in the *Chironominæ* has the styles, or apical lateral processes, directed straight backwards, while in the *Orthoclaudiinæ* these styles are folded against the inner sides of the basal pieces and so directed forward. The basal segment of the fore tarsi is usually as long as, or longer than, the fore tibia in the *Chironominæ* and the fore tibia rarely possesses a distinct spur, while in the other group the basal segment of the fore tarsi is shorter than the fore tibia and the latter has usually a distinct spur.

There are but two genera of this subfamily in the present collection, most of the species belonging to the genus *Chironomus* (*sens. lat.*), only one being referable to *Tanytarsus* (*sens. lat.*).

Genus *CHIRONOMUS* Meigen.

This genus has been divided into a large number of subgenera mainly on the structure of the hind tibial combs, pulvilli, fore tibial spurs, and pronotum, but it does not appear necessary to discuss these herein because of the small number of species to be dealt with in this collection. I have, however, given the subgeneric allocation of the species as I interpret them, and can state definitely that not one of them is identical with any, which I described in the report on the Pribilof Islands Diptera in 1923³.

KEY TO THE SPECIES.

1. Bright green species; mesonotum with four partial black vittæ; femora green; tibiae yellowish, becoming brownish apically; tarsi dark brown; wings with no dark cloud over the cross-vein r-m. sp.?
- Black or brownish black species, femora not green; the r-m cross-vein usually distinctly darkened. 2
2. None of the segments of the fore tarsi of the male with long erect fine hairs. 3
- At least the apical third or more of the basal segment and all of the next two or three segments of the fore tarsi of the male with long usually erect hairs, which are at least four times as long as the diameter of the segments. 4

²TRANS. ENT. SOC. LOND., Vol. LXVII, pt. 2, p. 286 (1929).

³NORTH AMERICAN FAUNA, No. 46, Bur. Biol. Surv., U. S. Dept. Agric., p. 170.

3. Hypopygium as shown in Figure 2; r-m cross-vein not distinctly darkened; legs slenderer, the mid and hind tibiæ darker at their extreme apices than elsewhere. *stægeri* Lundbeck
Hypopygium as shown in Figure 3; r-m cross-vein distinctly clouded; legs stouter, the mid and hind tibiæ uniformly deep black. *atritibia*, n.sp. nov.?
4. Long hairs on apex of basal segment and on entire second segment not erect; hypopygial processes as in Figure 4. *decumbens*, n.sp.
Long hairs on apex of first and all of second segment of fore tarsus erect and very fine. 5
5. Apical process of last tergite stout, when viewed from the side, as shown in Figure 5, the heavily chititized inner black process not slender at apex. *hyperboreus* Stæger
Apical process of last tergite slender, when viewed from the side, as shown in Figure 6, the heavily chititized inner black process hook-like, the apex slender. *unguiculatus*, n.sp.

4. *Chironomus* sp. ?

This species, to which I do not care to attach a definite identification, is of a bright green color, with four partial black mesonotal vittæ, and the dorsum of the abdomen partly dusted with grey, the legs green, with the tibiæ yellowish, becoming darker towards apices, where they are brown, and the tarsi dark brown. The wings are whitish hyaline, without a dark cloud over the cross-vein. Length, 6.5 mm. One female without date.

5. *Chironomus* (*Chironomus*) *hyperboreus* Stæger (Fig. 5).

Chironomus hyperboreus Stæger, Nat. Tidsskr. (2) I, p. 349 (1845), part.

Chironomus polaris Schiodte, Till. til Rink: Grøn. p. 67 (1857).

This and the next three species are very similar, all being black in color, with grey-dusted vittæ on the mesonotum, and the apices of the abdominal tergites more or less grey-dusted and sometimes narrowly testaceous. The legs are usually entirely black, but in some cases the tibiæ are brownish with black apices. The wings are greyish hyaline, with or without a dark cloud over the cross-vein. There is some variation in the color of the knobs of the halteres, which are sometimes all dark, and in some specimens yellowish at their bases. I fear that there must be an arbitrary assignment of the name *hyperboreus*, and, without a careful examination of the male hypopygium of the type-specimen, I accept the one figured herein as correct. The long-haired fore tarsi of the male and the shape of the apical dorsal process of the apical abdominal tergite coupled with that of the apical style and the inner heavily chititized process (Fig. 5a and b) distinguish the species from the others in this collection. Length, 6.5-7.5 mm. Three males, one with date July 3, 1930.



FIG. 5.

Chironomus hyperboreus, hypopygial structures of male: a, apex of style, dorsal view; b, inner process, dorsal view.

Four females may belong to this species or to *unguiculatus*. Two taken on July 3, 1930.

6. *Chironomus* (*Chironomus*) *stægeri* Lundbeck (Fig. 2).

Chironomus annularis Zetterstedt, Ins. Lapp., p. 809 (1840), part.

Chironomus hyperboreus Stæger, Nat. Tidsskr. (2) I, p. 349 (1840), part.

Chironomus stægeri Lundbeck, Vid. Medd. Nat. For. København, p. 271 (1898).



FIG. 2.

Similar to the preceding species, with which Stæger confused it, differing in the hairing of the fore tarsi of the male, the less evident pale apices to the abdominal tergites, and the structure of the hypopygium of the male (Fig. 2). Length, 7 mm. One male, July 1, 1930.

Chironomus stægeri, hypopygium of male: a, dorsal view of left side; b, terminal process of apical tergite in profile; c, inner process in profile.

7. *Chironomus* (*Chironomus*) *atritibia*, sp. nov.

(Fig. 3).

Male: Similar to the next preceding species, but a little larger and more robust, with stronger legs, and the general color of a deeper black. Hypopygium as in Figure 3, the apical dorsal process of apical tergite glossy black, heavily chitinized, flattened above, and beak-like in profile. Length, 8 mm. Type, July 3, 1930. One damaged male same date.

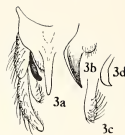


FIG. 3.

Chironomus atritibia, hypopygium of male: a, dorsal view of left side; b, terminal process of apical tergite in profile; c, outer process; d, inner process.

8. *Chironomus* (*Chironomus*) *decumbens*, sp. nov.

(Fig. 4).

Male: Similar to the preceding species, but the long hairs on the apical third of the basal and all of the second segment of fore tarsus are not as long as in the other, being only about three times as long as the diameter of the segments upon which they are situated, and they are directed towards the apices of the segments, not erect, though not lying close against their surfaces. The hypopygium is quite similar to that of *hyperboreus*, the apical dorsal process of the apical tergite being very similar, but the style is more attenuated at apex, and the inner process slightly different (Fig. 4). Length, 7.5 mm. One male without date.



FIG. 4.

Chironomus decumbens, hypopygial structures of male: a, apex of style, dorsal view; b, inner process, dorsal view; c, terminal process, of apical tergite, dorsal view.

9. *Chironomus* (*Chironomus*) *unguiculatus*, sp. nov.

(Fig. 6).

Male: Differs from *decumbens* in having the fore tarsal hairs very fine, erect, and much longer, and the hypopygium with the apical dorsal process of the apical tergite much slenderer when seen in profile, and not flattened on dorsal surface, the style not noticeably attenuated apically, and the inner black heavily chitinized process hook-like, with the apex curved and slender (Fig. 6). For other characters of all species see the key given above. Length, 7.5 mm. Type and five paratypical males without date.



FIG. 6.

Chironomus unguiculatus, hypopygium of male: a, left side from above; b, terminal process of apical tergite in profile.

Genus TANYTARSUS van der Wulp.

This genus is distinguished from *Chironomus* by the presence of macrotrichia on the wings. Until recently this was the only genus so distinguished, but there are many named groups, which have been separated from *Tanytarsus* in the strict sense, accepted by some workers as genera, and by others as subgenera or groups of lesser rank. As there is but one species among the material in hand it is unnecessary to deal with the status of these con-

cepts, the more particularly as that one species is referable to *Tanytarsus* in the narrower and limited sense.

Lundbeck has recorded *T. junci* Meigen and *tenuis* Meigen from Greenland, but the records should be carefully checked to determine if this occurrence of the European species is correct. The species now before me is not at all like *junci*, as accepted by European authorities. In *tenuis* the male has the mesonotum green, with black vittæ.

10. *Tanytarsus islandica*, sp. nov. (Fig. 7).

Male and female: Fuscous, the thorax and abdomen of the male almost black, with the former slightly shining. Legs fuscous, paler in female. Thorax of latter green, with the usual broad black vittæ. Wings hyaline. Halteres of male fuscous, of female dusky greenish.

Fore tibia of male hardly half as long as basal segment of fore tarsi, in the female fully half as long as that segment; tarsi of male without long erect hairs; mid and hind femora and tibiae of male with long erect hairs, those of female less conspicuously haired. Male hypopygium as shown in Figure 7. Macrotrichia rather sparse and inconspicuous. Length, 3 mm.

Type, male, without date; allotype also without date; one female paratype dated July 3, 1930.

This species will run down to *gmundensis* Egger in Needham's key to the American species, but the hypopygia of the two species are distinct.



FIG. 7.

Tanytarsus islandica, hypopygium of male: a, left side, dorsal view; b, right side, ventral view.

SUBFAMILY ORTHOCLADIINÆ.

I have briefly stated the characters by means of which this group may be separated from *Chironominae* under the introduction to the latter. A glance at the figure of the hypopygium of any species of *Chironomus* in this paper will show at once the distinction between that organ and the typical forms of it in *Orthocladinae*, some of which are figured herein also. There does appear to be a closer resemblance between the latter and *Tanyptinae* in so far as the hypopygia are concerned, but the venation of the wings readily separates them, and evidently the lack of the m-c cross-vein in the present group is a more significant character (linking them with the *Chironominae*) than the general structure of the hypopygium, which latter might be accepted as associating them with the *Tanyptinae*. The larvæ of the latter are said to be predacious, which is not the case in the two other subfamilies under discussion as far as I am aware.

The paucity of genera in the present collection precludes any discussion of the systematic relationships within the subfamily and I merely deal with the species available.

The subfamily contains two groups of genera, one with, and the other without macrotrichia, or distinct hairs, on at least the apices of the wings; both groups are represented in the present collection.

Genus METRIOCNEMUS Van der Wulp.

This genus has been divided into a large number of named segregates, some of them proposed as genera and some as subgenera, but they are with difficulty distinguished from each other, and do not appear entitled to even subgeneric status. It is of interest, however, to note here that the species from this collection belongs to *Metriocnemus* in the strict sense.

11. *Metriocnemus (Metriocnemus) perfuscus*, sp. nov. (Fig. 8).

Male: Entirely black, slightly shining, the mesonotum with greyish dust on the usual central and sublateral stripes, abdomen but faintly dusted on the apices of the tergites, more broadly so laterally; legs fuscous; wings hyaline; veins colorless, except the radius; halteres and squamæ dark brown.

Fore tarsi without long erect hairs, the basal segment over half as long as the fore tibia; mid and hind legs with the femora, tibiae, and at least the basal segment of the tarsi, with moderately long hairs. Hypopygium as shown in Figure 8, no distinct process on inner side of basal arm, the apical dorsal process of apical tergite slender. R_2 faint, ending near R_1 , R_{4+5} gradually approaching costa so that the cell ends in a narrow point and the costal vein is continued for some distance beyond the junction. Length, 3-4 mm.

Female: What I take to be the female of this species is similar to the male in color, the thorax being black and the legs fuscous, but it differs in having the wings yellowish and much more numerous and pale hairs which are present on almost the entire surface and not only on a part of the apical half, and the halteres are dirty yellow.

Type, male, allotype, and 5 male paratypes, all with date July 3, 1930.

There are six species of this genus recorded from Greenland, *ursinus* Holmgren, *fuscipes* (Meigen), *atratus* (Zetterstedt), *lundbecki* Johannsen, *debilipennis* (Lundbeck) and *incomptus* (Zetterstedt), but I cannot satisfy myself that the present species is referable to one of these and describe it as new.

Genus SPANIOTOMA Philippi.

This is the genus generally known in this country as *Orthocladius* Van der Wulp, but Philippi's name has priority and must be used.

There have been many genera proposed within the group, but perhaps the best way to treat these is as has been done by Edwards in his recent paper on the British *Chironomidae*, as subgenera. There appear to be but two in the present collection and it is my intention to simply deal with these.

12. *Spaniotoma (Trichocladius) pubitarsis* (Zetterstedt)

(Fig. 9).

Chironomus pubitarsis Zetterstedt, Ins. Lapp., p. 811 (1840).

Chironomus frigidus Stæger, Naturh. Tidsskr. (2) I, p. 351 (1845).

Orthocladius pubitarsis Mason, Ent. Mon. Mag., (2) I, p. 200 (1890).

A male and female which I accept as belonging to this species are in the collection. I have figured the male hypopygium (Fig. 9) as a check upon the identification.

Male, July 3, 1930, female without date.



FIG. 8.

Metriocnemus perfuscus, hypopygium of male, right side from above.



FIG. 9.

Spaniotoma pubitarsis, hypopygium of male, left side from above.

13. *Spaniotoma (Trichocladius) variabilis* (Stæger) (Fig. 10).

Chironomus variabilis Stæger, Nat. Tidsskr., II, p. 571 (1839).

A long series of male and female specimens which I accept as this species in the collection. The males show some variation in the color of the thorax, the black dorsal vittæ in

some specimens being so broad that they take up almost the entire disc, while in others there is a line of the green or yellow ground-color to be seen on the entire length of the mesonotum. The females as usual have the pale ground-color more evident, the black vittæ being always separated on the entire length of the mesonotum, and sometimes the vittæ are much paler in front. I have figured the hypopygium of the male (Fig. 10).

Eighteen specimens, five dated July 3, 1930; the others without date.

In a recent list of species occurring in Greenland Dr. F. W. Edwards has synonymized this species with *vitripennis* Meigen, which is probably correct.



FIG. 10.

Spaniotoma variabilis,
hypopygium of male, right
side from above.

Family CERATOPOGONIDÆ.

This group has usually been considered as a subfamily of the *Chironomida*, but the structure of the different stages and especially that of the proboscis of the imagines coupled with their predacious habits appear to me to justify family segregation. Many of the species of the smaller sized genera are blood-suckers and several, especially in the genus *Culicoides* Latreille, are irritating pests to man in various faunal regions. The larvæ and pupæ are aquatic in most genera, except *Forcipomyia* Meigen.

Genus CERATOPOGON Meigen.

14. *Ceratopogon sordidellus* Zetterstedt.

Culex pulicans O. Fabricius, Faun. Grœnl., 211, 173 (1780), not Linné (*lapsus* for *pulicaris*).
Ceratopogon sordidellus Zetterstedt, Ins. Lapp., p. 820 (1840).

I am accepting as this species one male and three female specimens of a black species, in which the thorax and abdomen are rather evenly dusted with grey and the legs are dark brown or fuscous. The mesonotum is without vittæ; the scutellum is concolorous with the remainder of thorax; and the wings are greyish hyaline without dark markings. Knobs of the halteres yellow.

The dorsal surface of the hind tibiæ and hind metatarsi in the male is furnished with quite closely placed hairs, which are at least three times as long as the diameter of the parts upon which they occur; the female has similar but less numerous hairs. The wings are haired on the apical costal halves, the costal vein extends almost two-thirds of the distance to wing tip, and R_1 is fused for a variable length with R_{2+3} instead of having R_2 narrow and vein-like. Length, 2 mm. One male and 3 females, July 3, 1930.

There is no record as to the conditions surrounding the capture of the species.

Family SCIARIDÆ.

This family until a few years ago was considered merely as a subfamily of the *Mycetophilidæ*, but is now held to be distinct therefrom.

Genus SCIARA Meigen.

About twenty species of this genus have been described or recorded from Greenland, but in the present collection there is but one.

15. *Sciara* sp. ?

One female belonging to a group in which the species are mainly distinguished from each other by the structure of the male hypopygia and in the absence of that sex consequently unidentifiable.

No date on label.

SUBORDER *BRACHYCERA*.

Division CYCLORRHAPHA.

Family PHORIDÆ.

Genus *MEGASELIA* Loiy.

This is the genus that has long been called *Aphiochata* Brues, the change having been made in recent years in Europe and generally accepted.

16. *Megaselia grænlandica* (Lundbeck).

Phora grænlandica Lundbeck, Vid. Medd. Nat. For. Kobenhaven, p. 307 (1900).

Aphiochata grænlandica Lundbeck, Medd. om Grænl., XXII, p. 620 (1917).

One specimen in the collection agrees well with the description of this species, but absolute identification requires a fuller description of the original specimen. No exact date on label.

It appears pertinent to note that I have adopted the recent system of classification of the Order given by Tillyard in his "Insects of Australia and New Zealand," though to my mind there are yet some points in connection with its general adoption which require elucidation. This statement is made to clarify the situation brought about by the change in placing the old group *Cyclorrhapha* under the *Brachycera* as a "Division," instead of accepting it as a "Suborder" in the same manner as the *Nematocera*. No American authority has dealt with the Diptera in a comprehensive manner since the above change was proposed, so that my acceptance of the scheme is only tentative.

Family SYRPHIDÆ.

There have been eleven species of this family recorded from Greenland by Lundbeck in various papers, and four of the species so recorded are among the material of the present collection.

Genus *PLATYCHIRUS* St. Fargeau and Serville.17. *Platychirus hyperboreus* (Stæger).

Syrphus hyperboreus Stæger, Naturh. Tidsskr., (2), I, p. 362 (1845).

Platychirus hyperboreus Lundbeck, Vid. Meddel. Nat. For. Kobenhaven, 1898, p. 301.

One female in rather poor condition, with the abdomen crushed and discolored, which I accept as this species, July 3, 1930.

Genus *SYRPHUS* Fabricius.18. *Syrphus tarsatus* (Zetterstedt).

Scava tarsata Zetterstedt, Ins. Lapp., p. 601 (1840).

Scava lunulata Zetterstedt, l.c., p. 600.

Syrphus tarsatus Stæger, Naturh. Tidsskr., (2), I. p. 360 (1845).

Scava dryadis Holmgren, Vet. Akad. Handl., Vol. VIII, 5, p. 26 (1869).

Syrphus tarsatus Collin, Ann. Mag. Nat. Hist., Vol. XI, 9, p. 117 (1923).

This species is apparently very variable in color in both sexes, though the wide yellow central part of the face with the tendency to the presence of a central dark stripe over the central prominence is rather constant. The black tarsi with the swollen basal segment of the hind pair, which are most developed in the male, and the narrow yellow transverse marks on the abdominal tergites appear to be distinctive, though Collin in the paper referred to above in the synonymy has recorded a variety of the female, in which the abdomen has the yellow marks lacking, and the legs much darker than usual, while the face is almost without the pale central mark. Male, July 1, 1930; female, July 3, 1930.

Genus *HELOPHILUS* Meigen.

There are two species of this genus recorded from Greenland. Both of them are represented in the present collection.

19. *Helophilus grœnlandicus* (O. Fabricius).

Tabanus grœnlandicus, O. Fabricius, Faun. Grœnl., p. 208 (1780).

Helophilus bilineatus Curtis, App. Voy. J. Ross, 77, 30 (1835).

Helophilus arcticus Zetterstedt, Ins. Lapp., 595, pt. (1840).

Helophilus grœnlandicus Schiødte, Tillæg til Rink, "Grœnland, etc." p. 68 (1857).

This species averages smaller than *H. borealis*, and has some black hairs on the posterior portions of the black mesonotal vittæ. The hypopygium of the male is also distinct as noted by Collin.⁴

Four specimens, both sexes, two taken on July 3, 1930, the others without date of capture.

20. *Helophilus borealis* Stæger.

Helophilus borealis Stæger, Naturh. Tidsskr., (2) I. p. 359 (1845).

This species has no black hairs on the posterior portions of the black mesonotal vittæ.

It is less widely distributed than *H. grœnlandicus* as far as one may judge from the records, the preceding species being reported from the Palearctic region and in America as far south as Colorado, while *H. borealis* is almost exclusively arctic and there is some question of its occurrence in the Palearctic region.

The only specimen available from Southampton Island is a female, which has the hairs on the central part of the apical section of the fourth visible tergite much shorter and stronger than is the case in the females of *grœnlandicus* I have seen. No date of capture on label.

Family *PIOPHILIDÆ*.

This family contains comparatively few genera and most of the species are placed in the genus *Piophila* Fallen, which genus has recently been divided by Duda into several subgenera of rather doubtful standing, which are not recognized herein. The larvæ, as far as known, feed in decaying animal matter. Four species have been recorded from Greenland, but only two are represented in the Southampton Island collection.

⁴Ann. Mag. Nat. Hist., (10) VII, p. 90 (1931).

Genus *PIOPHILA* Fallen.21. *Piophila pilosa* Stæger.

Piophila pilosa Stæger, Naturh. Tidsskr., (2) I, p. 368 (1845).

Duda erected the subgenus *Lasiopiophila* for the reception of this species, using as the distinguishing character thereof the presence of hairs on the scutellum.⁵ Sometimes the fine hairs are almost entirely lacking on the disc of the scutellum, but there are in all the specimens I place here two short stout spike-like processes at the apex of the scutellum, one on each side of the apical bristles, which are not mentioned by Duda, but which might be considered of more importance than the hairs. There is considerable variation in the length of the specimens before me, 2-3.5 mm, and the density of the hairing varies also.

Twenty-three specimens, both sexes, nearly all dated July 3, 1930.

22. *Piophila aterrima* Becker.

Piophila aterrima Becker, Mém. de l'Acad. Imp. des Sci. St. Petersburg., p. 402 (1897).

This species, which was originally described from Nova Zembyla, has not previously been recorded from this continent, although I have seen many specimens from Herschell Island, N. W. T., collected by Owen Bryant. Duda in the paper above referred to placed it in his new subgenus *Allopiophila*. One male, no date.

Family HELOMYZIDÆ.

The members of this family are almost all carrion feeders and quite a few of them occur in the arctic regions, though but one is present in the collection now in hand.

Genus *NEOLERIA* Malloch.

This genus was erected for the reception of a species described in my report on the Canadian Arctic Diptera. It has since been sunk as a synonym of a European species, as indicated below.

23. *Neoleria tibialis* Zetterstedt.

Helomyza tibialis Zetterstedt, Ins. Lapp., p. 767 (1838).

Tephrochlamys prominens Becker, Ann. Mus. Zoöl. Acad. Imp. Sci. St. Petersburg., Vol. II, p. 402 (1897).

Neoleria rotundicornis Malloch, Rept. Canad. Arct. Exped. 1913-18, Vol. III, Pt. C, p. 83c (1919).

Leria septentrionalis Collin, Ann. Mag. Nat. Hist., (9) XI, p. 121 (1923).

Collin in a recent paper⁶ has cast some doubt upon the application of *tibialis* as the correct name of this species, but Czerny, who is probably the best authority on the family, accepts it and there is no doubt as to the applicability of the other names cited above.

The species occurs very abundantly in the northern parts of Canada, and I have seen it from Churchill on Hudson Bay, Herschell Island, and various localities in the Northwest Territories in collections made by Owen Bryant.

In the Southampton Island material there are nineteen specimens representing both sexes, mostly taken on July 3, 1930.

Collin has reported the species from the nest of *Larus glaucus* Linné, and specimens from St. Kilda, and Bear Island near Spitzbergen.

⁵Konowia, Vol. 3, p. 109 (1924).

⁶Ann. Mag. Nat. Hist., (10) VII, p. 90 (1931).

FAMILY MUSCIDÆ

SUBFAMILY SCATOPHAGINÆ.

This subfamily contains numerous genera of arctic distribution, but only two of them are represented in the present collection. I published a comprehensive key to the genera in my report on the Diptera of the Canadian Arctic Expedition in 1919.

Genus SCATOPHAGA Fallen.

This genus contains many species, which occur in the far north in both hemispheres, but only two are represented from Southampton Island. The larvæ, as far as they have been reported, feed in manure; and the flies are in the main predacious, though they may be found on flowers and at sap of trees. Their principal insect-food consists of small Diptera.

24. *Scatophaga lanata* Lundbeck.

Scatophaga lanata Lundbeck, Vid. Medd. Nat. For. Kobenhavn, p. 294 (1900).

Scatophaga nigrolanata Cresson, Ent. News, Vol. XXIX, p. 136 (1918)?

This species, of which I have seen two paratypes in the collection of the United States National Museum, has the prosternal plate haired, and usually one or two fine hairs on the upper margin of the hypopleura in front of the spiracle. The presence of hairs on the prosternum readily distinguishes the species from any other found in the immediate region of Southampton Island, but there are two species from the Alaskan region which have the same character, *vulpina* Coquillett and *rubicunda* Malloch. Of these two I am convinced that the former is distinct from *lanata*, but I am in considerable doubt about the claim to distinction of *rubicunda* though as a rule the specimens appear rather distinct on the basis of color both of the body and the hairs covering it. Further investigation is required to determine the status of this form, which was described from the Pribilof Islands. The only other species, in which there are hairs on the prosternum, is in my experience *tropicalis* Malloch, originally described from tropical South America by Szilady, and peculiarly enough under the preoccupied name *lanata*. There does not appear to me to be any close affinity between the northern and southern species, the latter appearing to be more like *stercoraria* Linné than *lanata*.

There is considerable variation in the color of this species, the abdomen is sometimes distinctly reddish brown at apex and sometimes entirely fuscous, the legs are occasionally entirely red, but usually the bases of the fore femora are dark, and in the smaller specimens the femora of all legs may be black, and slightly shining. The similarity in the fifth sternite and the fine apical dorsal bristle on the hind tibia, as well as the similarly colored antennæ and dark hairs of the abdomen, incline me to disregard the variation in other features as indicative of specific distinction. Seven specimens, both sexes, one with date July 5, 1930.

25. *Scatophaga nigripes* Holmgren.

Scatophaga nigripes Holmgren, Ent. Tidskr., Vol. IV, p. 172 (1883).

Scatophaga islandica Becker, Berl. Ent. Zeitschr., Vol. XXXIX, p. 175 (1894).

This species is much darker than the preceding one and has the prosternum and hypopleura bare, though there are hairs on the pteropleura which are not present in *lanata*. It occurs throughout the far northern portions of Canada and Alaska eastward through Greenland to Iceland though as far as we know at present it does not occur in Europe. One female, no date.

Genus ERNONOEURA Becker.

This monobasic genus was originally described from Europe, but has been reported from the Northwest Territories in my Canadian Arctic Report.

26. *Ernoneura argus* Zetterstedt.

Scatomyza argus Zetterstedt, Ins. Lapp., 725 (1840).

Ernoneura argus Becker, Berl. Ent. Zeitschr., Vol. XXXIX, p. 135 (1894).

Becker placed the genus in his Section *Hydromyzina* but it belongs very close to *Scatophaga*, from which it is distinguished mainly by the presence of a number of small brown marks between the wing veins, in most of which there are short stumps of veins, at least along the posterior side of the second vein. There is a weak, but evident, stigmal bristle present, which may be the reason why Becker placed the genus where he did, but occasionally this is met with in *Scatophaga* also, and the tibial bristles, though less numerous in *Ernoneura* than is the rule in *Scatophaga*, are not sufficiently reliable to justify their use as a generic criterion. There are a number of fine hairs on the centre of the pteropleura in *argus* similar to those met with in a number of species of *Scatophaga*, such as the one listed immediately above, and also in a few other genera which do not belong to the immediate group containing these two genera. One female, without date.

It appears probable that this species is of holarctic distribution and that it has similar habits to most species of the preceding genus though nothing is known of its life-history.

SUBFAMILY ANTHOMYIINÆ.

This subfamily is distinguished from the former by the normal lack of hairs on the centre of the propleura, or when these are present the much narrowed frons of the males, and usually in the females the presence of a pair of cruciate bristles on the interfrontalia, the latter being always lacking in the *Scatophagina*. The sternopleural bristles are almost invariably three in number; in the two genera recorded in the preceding subfamily there is but one present.

The present subfamily is readily distinguished from the next by the complete sixth wing-vein, the latter failing to reach the margin of the wing in the *Phaonina* and subsequent subfamilies in the classification.

There are but three genera represented in this collection, each by one species.

Genus FUCELLIA Robineau-Desvoidy.

This genus has been dealt with in recent years by Stein, and Aldrich, so that one may readily identify the species. The common name "Kelp-Flies" has been applied to the insects by Aldrich as many of them occur in their larval stages in kelp thrown up on the seashore by the waves, though one species on the Pacific coast feeds upon the eggs of a small fish which are deposited in the sand above high water-mark at very high tides at a certain season of the year. The flies are predacious, as far as my experience goes, and do not occur far from the water.

There is but one species in the present collection though several more occur in adjacent territory.

27. *Fucellia ariciiformis* (Holmgren).

Scatophaga ariciiformis Holmgren, Köngl. Vet. Akad. Forh., No. 6, p. 103 (1872).

Fucellia ariciiformis (Holmgren) Lundbeck, Vidensk. Medd. Naturhist. Foren. Kobenhaven, p. 292 (1900).

I have in past papers on Arctic material recorded this species from the Pribilof Islands, and the Northwest Territories. Aldrich has distinguished a species that he named *hinei* from Kodiak Island, Alaska, which I confess my inability to separate from the species here accepted as *ariciiformis*, though I must admit that I have not seen the type and paratype which are in the Ohio State University collection and am merely going upon specimens identified as *hinei* by its describer. I have seen specimens from Greenland identified as Holmgren's species by Lundbeck and the specimen now before me from Southampton Island agrees absolutely with these. I have not examined any specimen that will run to the caption in Aldrich's key containing the two forms under discussion that has any evident cloud at the apex of the wing such as is mentioned in the original description of *hinei*, so am not inclined to consider the two names are applicable to one species. One male, July 1, 1930.

Genus ACROPTENA Pokorný.

This genus I did not accept when I was working on the Canadian Arctic species, placing those referable to it in *Hydrophoria* Robineau-Desvoidy. I am now giving it generic status as the species can all be readily distinguished from those in the other group by a reliable character, the presence of fine hairs on the upper anterior margin of the hypopleura, *Hydrophoria* lacking the hairs. The arista is generally shorter haired in this genus.

Seven of the species included in my key to the species of *Hydrophoria*⁷ will fall thus into *Acroptena*. Two of these species occur in the Eastern Arctic section of Canada, but only one is among the material brought back by Sutton.

28. *Acroptena frontata* (Zetterstedt).

Anthomyza frontata Zetterstedt, Ins. Lapp., p. 669 (1840).

Acroptena frontata Neilsen, Medd. o. Græn., 29, p. 396 (1907).

Hydrophoria arctica Malloch, Rept. Can. Arct. Exped. 1913-16, Vol. III, pt. C, p. 69e (1919).

When I described *arctica* I had before me several species from Northern Europe identified by Mr. O. Ringdahl, and a few identified by the late Dr. M. Bezzi, the latter being mainly from the mountainous regions of central Europe, and amongst these were specimens identified as *frontata* by Bezzi. The species thus identified is quite distinct from *frontata* as now recognized, and this caused me to accept the Canadian species as new. There are in Europe two closely allied species, which until recently have been confused, but of these only *frontata* has been definitely recorded from the New World and as the characters cited for the recognition of *frontata* agree closely with those of *arctica* I propose to drop the latter as a synonym.

I have no males of the Greenland species before me at this time. Two females, July 1, 1930.

Lundbeck has recorded *Acroptena divisa* Meigen and *Hydrophoria brunneifrons* Zetterstedt from West Greenland. The first named species is found commonly in many parts of the United States and may be expected to occur on Southampton Island, but *brunneifrons* I have not seen from America, nor is there a specimen identified as either by Lundbeck in the material sent by him to the United States National Museum.

⁷Can. Ent., Vol. LII, p. 253 (1930).

Genus *ALLIOPS* gen. nov.

This genus is very similar to *Alliopsis* Schnabl and Dzeidzicki, in which I originally described the genotype. Subsequent comparison with the genotype of the latter appears to justify the separation now proposed, as *Alliops* has numerous setulose hairs on each side of the prosternal plate, while in *Alliopsis* this plate is entirely bare.

In the subfamily *Anthomyiinae* the presence of hairs on the prosternum is comparatively rare and is generally of sufficient importance to justify its acceptance as a generic character, a statement which applies equally well to the other subfamilies, except the *Scatophaginae* as far as my present information goes. In all other structural characters the two genera under discussion are in close agreement, the haired eyes being sufficient to distinguish them from nearly all the others in this subfamily, in which this character is quite rare as compared with the *Phaoninae*.

Genotype, *Alliopsis obesa* Malloch.

29. *Alliopsis obesa* (Malloch).

Alliopsis obesa Malloch, Rept. Can. Arct. Exped. 1913-18, III, C, 70c (1919). ♂.

Alliopsis sp. ?, *ibidem*, 71c. ♀.

Originally I had but one specimen of each sex and was not certain whether they belonged to the same species, but this I now believe to be the case. For a full description of the species see the paper above cited.

In the present collection there are five specimens in good condition, only one of which bears a date, July 1, 1930.

Nothing is known of the early stages of the species, but I have reared the closely allied genus *Lasiomma* Stein from bird's nests in Scotland.

On my request Doctor MacDonough had Doctor Fulke, who was then in Ottawa, examine the type specimens to determine whether the prosternum was haired, as in my original description this feature was omitted.

SUBFAMILY PHAONINÆ.

The members of this subfamily are distinguished from those of the preceding by the incomplete sixth wing-vein, the almost invariable lack of a strong basal ventral bristle on the hind tarsi, and the larger lower calypter which is invariably well protruded beyond the upper one. There is a greater tendency of the species to have four pairs of postsutural dorsocentral bristles and the hind tibia has usually few, if any, strong bristles on the posterodorsal surface, one of the notable exceptions being *Pogonomyia* Rondani, and to a lesser extent those genera most closely related thereto, in which we also find an exception to the general rule in this subfamily in the presence of a pair of cruciate interfrontal bristles in the females, and also one or more proclinate outer orbitals on the upper half of the frons.

Genus *POGONOMYIODES* Malloch.

I erected this genus for the reception of one species, which I described under the name *atrata*, but which has subsequently been found to be a synonym of a species described by Holmgren.

The genus is very similar to *Pogonomyia* Rondani, differing in having some fine hairs on the center of the pteropleura, no long bristles on the posteroventral surface of the hind tibia, and the anterior intra-alar bristle very weak or lacking.

30. *Pogonomyioides segnis* (Holmgren).

Aricia segnis Holmgren, Ent. Tidskr., Vol. IV, p. 169 (1883).

Pogonomyioides atrata Malloch, Rept. Can. Arct. Exped., Vol. III, pt. C, p. 67c (1919).

Pogonomyioides segnis Holmgren, Malloch, Proc. Cal. Acad. Sci., Vol. XI, p. 180 (1921).

Suggested synonymy of *atrata*.

This species was known to me when I described *atrata* in the female sex only, and the male with the very marked tuft of fine bristles beyond the middle of the ventral surface of the mid femur was unknown to me until some years afterwards. There is a fine male amongst the present material. No date on label.

Genus *HELINA* Robineau-Desvoidy.

Several species of this genus extend their range into the arctic regions of both the Old and the New Worlds, but only one such species is amongst those in the present collection.

31. *Helina luteisquama* (Zetterstedt).

Aricia luteisquama Zetterstedt, Dipt. Scand., Vol. IV, p. 1492 (1845).

This species was unknown to me, when I published my key to the species of this genus in the 'Canadian Entomologist' several years ago and was recorded first from this continent by Stein at a later date.

It rather closely resembles *fulvisquama* Zetterstedt, forming a natural group with it and one other European species not yet recorded from this continent; all being of northern or alpine distribution. As there is no English description of the species available a few of the more salient characters are given below to enable American students to identify it, should it occur in subsequent collections.

Black, including the antennæ, palpi, and legs; the frontal orbits, face, and cheeks dusted with white; thorax dusted with brownish; the mesonotum with four dark vittæ, the abdomen slightly checkered with brown dust and a pair of poorly defined dark subtriangular spots on second and third tergites; the disc of first tergite almost all dark and that of fourth not as distinctly marked as the third. Wings brownish hyaline; veins dark brown; both cross-veins very narrowly browned; bases of wings, the calyptræ, and halteres orange-yellow.

Eyes moderately hairy; frons at narrowest point in male not as wide as third antennal segment; arista very short haired; palpi normal. Mesonotum with four pairs of strong postsuturals; prealar long; sternopleurals three. Abdomen narrowly ovate. Hind femur slightly curved, with four or five preapical anteroventral bristles; mid tibia without a posterior tubercle near base, but with a series of closely placed short setulæ on basal fourth of posterior surface and beyond these one or two stronger bristles; hind tibia with a series of about ten long bristles from basad of the middle to apex on the posterodorsal surface; two or three anterodorsal bristles; a series of short bristles on most of the extent of the anteroventral surface, and a group of fine and rather prominent hairs at apex on the posterior side. All wing-veins bare. One male, no date.

The related species *fulvisquama* Zetterstedt occurs in Labrador and some of the mountainous parts of Canada. I redescribed this species under the name *tuberculata* in the 'Canadian Entomologist' several years ago from Labrador.

Genus *MYDÆINA* Malloch.

This genus was described in my report on the Canadian Arctic Diptera some years ago for the reception of a single species. It belongs to the same group as *Spilogona*, but the characters justify its separation therefrom. The puparium is unique in its structure in the family as far as I am aware. The larvæ are aquatic.

32. *Mydaeina obscura* Malloch.

Mydaeina obscura Malloch, Rept. Can. Arct. Exped. 1913-18, Vol. 3, pt. C, p. 62c (1919).

A very dark species, with cylindrical abdomen in the male and no indication of dark dorsal spots, which characterize most species of *Spilogona*. The lower calypter is much narrower than usual and rounded at apex. A distinctive feature of the species lies in the long and almost uniformly thick tarsi with the almost entire lack of setulose hairs on them.

Eight specimens, including both sexes, some with the date July 3, 1930, the others without date.

Originally described from the Northwest Territory.

Genus *SPILOGONA* Schnabl.

This genus has generally been considered as merely a subgenus of *Limnophora* Robineau-Desvoidy, but it is readily distinguished therefrom by the lack of setulae on the prosternum and the base of the third wing-vein. Both genera and several others related to them lack a well developed prealar bristle and the calcar on the hind tibia.

In 1930 J. E. Collin published a revision of the Greenland species of the genus *Limnophora* (*sens. lat.*) in which paper he included the genus *Spilogona*.⁸ I have found it rather difficult to determine the species in this and other collections by the use of this paper, as there is considerable variation in the hairing and bristling of the thorax and legs, and also in the size and color of the specimens in the arctic material. Another comprehensive paper which is appearing at this time by Mr. H. C. Huckett does not include all the northern species, ten of those recorded from Greenland by Collin being omitted, because of lack of an opportunity to study them.⁹ I have I hope surmounted the difficulties in the way of identifications and believe the names submitted herein are entirely reliable.

Of the eight so-called subgenera listed by Huckett in the paper just referred to this is the only one amongst the material now before me.

33. *Spilogona almqvisti* (Holmgren).

Aricia almqvisti Holmgren, Nov. Spec. Ins. Nordensk. Nova. Sem. descr., p. 17 (1881), and Ent. Tidskr., Vol. IV, p. 167 (1883).

Limnophora rostrata Ringdahl, Ent. Tidskr., Vol. XLI, p. 26 (1920).

Limnophora angulata Malloch, Trans. Amer. Ent. Soc., Vol. XLVI, p. 151 (1920).

The above synonymy is given by Collin. The figures given by that writer and myself do not agree exactly, but possibly there is sufficient variation in the species to account for the differences shown. There are but females of the species in the present collection, so that it is impossible to check up on the hypopygium. The two females available are readily distinguished from allied species by the following characters: Frons black; orbits dark brown almost to level of antennal bases and rather wide, with numerous long bristly hairs laterad of the inner marginal bristles and almost as long as them, those on the upper third recurved, the others mostly incurved; face, parafacials, and genae densely dusted with grey; face with a broad, rounded carina separating the antennal bases; vibrissal angle protruded about twice as far beyond anterior margin of eye as is the anterior extremity of the frons; arista thickened on basal fourth of more, pubescent, second segment about twice as long as thick. Hairs on mesonotum and pleura quite long, the postsutural dorsocentrals rather variable, usually four pairs, only the posterior pair strong. Genitalia without a terminal

⁸Trans. Ent. Soc. Lond., Vol. 78, p. 255.

⁹Jour. N. Y. Ent. Soc., Vol. 40, No. 1, p. 25 (1932).

crown of curved spines. Fore tibia usually with one or more posterior median bristles; mid tibia usually with two or more anterior and posterior submedian bristles; hind tibia with two or more anteroventral, anterodorsal, and posterodorsal bristles; mid and hind femora with long bristly hairs on the anteroventral and posteroventral surfaces, extending to apex only on the anteroventral surface of the hind pair. Squamæ yellowish white, margins yellow. Halteres brown. Length, 6-8 mm. Two females without date.

34. *Spilogona sanctipauli* (Malloch) (Fig. 11).

Limnophora megastoma Frey, (nec Boheman), Mem. Acad. Sci. Russ., Vol. XXIX, p. 27 (1915).

Limnophora sanctipauli Malloch, Proc. Calif. Acad. Sci., Vol. XI, No. 14, p. 180 (1921).

Limnophora triangulifera Lundbeck, (nec Zetterstedt), Vidensk. Medd. naturh. Foren. Kjob., 1898, p. 312.

The above synonymy in less complete form is that presented by Collin in the paper already referred to herein. I believe it is correct.

The species is a smaller one than the preceding, with the vibrissal angle much less produced but still farther in front of the anterior margin of the eye than is the anterior extremity of the frons. The male has the frons about as wide as the third antennal segment, the orbits much wider than the interfrontalia at narrowest point of latter, where it is almost obliterated in some specimens, orbits, parafacials, and anterior portion of genæ silvery white; the female has the frons over one-third the width of the head, with the triangle and orbits dull greyish brown, the inner margins of the latter darker, and the interfrontalia reddish brown; parafacials, face, and genæ dull greyish brown; each orbit with four or five inner marginal bristles, the upper one curved slightly outward over eye and the anterior series incurved, the hairs laterad of the bristles very fine, short, and not numerous. Presutural acrostichal hairs very fine and short, biserial; the mesonotum, especially in the male, much more distinctly dusted with whitish grey than in the preceding species, and with three dark brown vittæ, which are confluent behind the suture. Fore tibia usually without a median posterior bristle; mid tibia without ventral bristles and with two or more anterior and posterior bristles; hind tibia usually lacking the submedian posterodorsal bristle; mid femur with some long fine bristles on basal half of the posteroventral surface; hind femur with a complete series of rather weak anteroventral bristles and a few fine hairs on basal half of posteroventral surface, which are not as long as the femoral diameter. Hypopygium as shown in Figure 11. Length, 5-6 mm.

Three males and three females, July 1, 1930, one male July 3, and one male without date.

There is one female without date in the collection which differs from the others in having the orbits, parafacials, and genæ dusted with silvery white except along the inner margin of each frontal orbit where the color is brown. This specimen does not differ in other respects from the typical form, so I consider it merely aberrant. Some specimens in the series lack one of the dorsocentral bristles on one side behind the suture, and there is some variation in the presence or absence of the submedian bristle on the fore tibia and the posterodorsal bristle on the hind tibia. There is also some slight variation in the position of the inner cross-vein of the wing.

35. *Spilogona hyperborea* (Boheman).

Aricia hyperborea Boheman, Öfvers. Vetensk. Akad. Förh., Vol. XXII, p. 571 (1865).

Aricia labiosa Boheman, l.c.

Aricia dorsata Holmgren, (nec Zetterstedt), K. Svenska Vetensk. Akad. Handl., Vol. VIII, p. 29 (1869).



FIG. 11.

Spilogona sanctipauli, hypopygium of male: a, forceps in profile; b, right half of superior forceps from behind; c, penis in profile.

Aricia fuliginosa Holmgren, *l.c.*, p. 30.

Aricia conspurcata Holmgren, *l.c.*, p. 31. ♂.

Aricia illota Holmgren, *l.c.*, p. 32.

Limnophora frigida Ringdahl, Ent. Tidskr., Vol. XLI, p. 27 (1920).

Limnophora pearyi Malloch, Trans. Amer. Ent. Soc., Vol. XLVI, p. 151 (1920).

I am accepting the above synonymy given by Collin.

The species is rather small and dark, with the vibrissal angle produced much as in the preceding species; the mid tibia with one or more short bristles on the anteroventral and posteroventral bristles beyond the middle, and the hind femur with no posteroventral bristles and a series on apical half of the anteroventral surface, the apical three of which are quite long and conspicuous. From *sanctipauli* it is distinguished mainly by the ventral bristles on the mid tibiae and a rather faint cloud over the outer cross-vein of the wing. The male has the fifth abdominal sternite with a wider and shallower cleft than in *sanctipauli*; a short rounded protuberance at apex of each lateral lobe that is not present in that species; and less dense and shorter hairs on each side. Length, 5-6 mm.

Two males and one female without date.

36. *Spilogona latilamina* Collin.

Limnophora (Spilogona) latilamina Collin, Trans. Ent. Soc. Lond., Vol. 78, p. 266 (1930).

One male and two females which I identify as this species are in the collection, none of them with exact date.

37. *Spilogona* sp. ?

One female which closely resembles the preceding one, but without a male I do not care to give it a name.

38. *Spilogona* sp. ?

Two females in rather poor condition which I cannot specifically identify.

39. *Spilogona dorsata* (Zetterstedt) (Fig. 12).

Aricia dorsata Zetterstedt, Dipt. Scand., Vol. 4, p. 1472 (1845).

This species has not previously been recorded from the New World but in the material before me there is one male which agrees with the description, resembling *hyperboreus* very closely, and differing in the hypopygial structure (Fig. 12). I realize that there may be some species of the genus so closely similar that the hypopygial characters show but few distinguishing features, but in the case in hand there are no greater disparities between the male figured and that shown in the paper on the Greenland species by Collin in which *dorsata* is figured though not described, than there is between the specimens of *sanctipauli* figured herein and in Collin's paper. I have carefully examined many species on the basis of these characters and as in all others there are certain departures from normal, so that it is necessary to allow somewhat for this in making identifications.

Until recently *dorsata* was considered as synonymous with *hyperboreus*, but it is now accepted as distinct.

One male without exact date.



FIG. 12.

Spilogona dorsata, hypopygium of male: a, superior forceps, right side from behind; b, forceps in profile.

40. *Spilogona subrostrata* (Stein) (Figs. 13 and 14).

Limnophora subrostrata Stein, Arch. f. Naturges., 1918, Vol. 84, p. 54 (1920).

One male of which I identify as this species and of which I figure the hypopygium (Fig. 13). The mid tibia has a distinct submedian posteroventral bristle and the epistome projects slightly beyond the level of the anterior extremity of the frons.

I have carefully compared it with a male of *brunneisquama* Zetterstedt, which it closely resembles in general structure, and also in hypopygial characters, but am convinced it is distinct. The female recorded immediately after *latelamina* herein may belong to this species and, if so, it is more readily distinguishable from that of *brunneisquama* than is the male, the much longer frontal triangle and other characters of the head being quite distinctive. Date, July 3, 1930.

Previously recorded only from British Columbia.



FIG. 13.

Spilogona subrostrata, hypopygium of male: a, right side from behind; b, forceps in profile.



FIG. 14.

Spilogona subrostrata, fifth sternite of male, right side.

Family CALLIPHORIDÆ.

Several genera of this family are usually met with in the far north, but only one species is in the present collection.

Genus CYNOMYIA Robineau-Desvoidy.

41. *Cynomyia cadaverina* Robineau-Desvoidy.

A common carrion-feeding species, which extends over northern Europe and America. Five females with dates July 3 and 4, 1930.

Family ŒSTRIDÆ.

Genus ŒDEMAGENA Latreille.

42. *Œdemagena tarandi* (Linné).

Œstrus tarandi Linné, Fauna Suec., 2nd edit., 429 (1761).

After receiving from Dr. Malloch his admirable report upon the Diptera collected by Dr. Sutton I discovered among some material preserved in alcohol about thirty larvæ of the Œstrid, which infests the Reindeer, or Caribou, and to which Sutton makes reference in his account of that mammal (See Memoirs Carn. Mus., Vol. XII, Part II, Sect. 1, p. 84). After conference with Dr. Hugo Kahl, an accomplished dipterist, we came to the unanimous conclusion that these larvæ are those of *Œ. tarandi* (L.) which is known as a parasite of the Reindeer in both the Old World and the New. The larvæ were taken from the skin of a Caribou, killed in November, and are therefore immature.

I take the liberty of inserting this note in Dr. Malloch's paper at the point where the Œstridæ occur in most lists of the Diptera. W. J. HOLLAND.

Family TACHINIDÆ.

Tribe PHOROCERATINÆ.

Genus MURDOCKIANA Townsend.

This monobasic genus was erected for the reception of a species, originally described as a *Euphorocera* by Coquillett, which, so far as known, occurs only in the Arctic portions of Canada and Alaska.

43. *Murdockiana gelida* (Coquillett).

Euphorocera gelida Coquillett, Revis. Tachin., 1897, p. 101.

Murdockiana gelida Townsend, Proc. U. S. Nat. Mus., Vol. XLIX, p. 622 (1916).

A shining black species with white dusted frontal orbits and face and similarly dusted bases to the abdominal tergites, the scutellum yellowish brown apically. Like all the species of *Phorocera* Robineau-Desvoidy the facial ridges are strongly bristled from above vibrissæ to above middle, and the prosternal plate has some bristly hairs on the sides. The lengthened second segment of the arista, which is not less than three times as long as its diameter, distinguishes the genus from its relatives, though the distinction is rather finer than one might reasonably desire in a group, in which all sorts of variations occur in this particular organ.

One male, July 3, 1930.

I have compared this specimen with the type material in the collection of the United States National Museum and find it in perfect agreement.

IV. HYMENOPTERA.

By W. D. McILROY, JR.

Mr. Sutton made a rather full collection of the *Bremidæ* but very few specimens representing other families were obtained by him, two Tenthredinids and six Ichneumonids.

The Tenthredinids were referred to Mr. H. H. Ross, who for some time has specialized in this family, and he reports that while the generic reference is absolutely correct as determined by Mr. McIlroy, he does not feel justified in attempting specific determination in view of the obscurity of many of the descriptions which have been published.

The Ichneumonidæ representing four genera are also left without specific determination.

TENTHREDINIDÆ.

NEMATINÆ.

Pteronidea sp., 1 ♀, July 3.

Pteronidea sp., 1 ♀, July 3.

ICHNEUMONIDÆ.

CRYPTINÆ.

Hemiteles sp., 1 ♂, July.*

TRYPHONINÆ.

Polyblastus sp., 1 ♀, July.

Polyblastus sp., 1 ♀, July.

Mesoleius sp., 1 ♂, July.

Mesoleius sp., 1 ♂, July.

OPHIONINÆ.

Eusterinx ? sp., 1 ♂, July.

BREMIDÆ.

Genus *BREMUS* Jurine.

Bremus polaris (Curtis).

Bombus polaris Curtis, Descr. Insects Ross' Second Voyage, 1835, App. p. 63, No. 7.

1 ♀, July 1; 4 ♀ ♀, July 12.

Bremus arcticus (Kirby).

Bombus arcticus W. Kirby, Anim. Parry's First Voyage, 1821, Suppl. to App., p. 216.

1 ♀, July 4; 1 ♀, July 7; 1 ♀, July 12.

Bremus sylvicola (Kirby) var. *gelidus* (Cresson).

Bombus gelidus Cresson, Proc. Acad. Nat. Sci. Phila., 1878, p. 184.

1 ♀, June 27; 5 ♀ ♀, July 1; 3 ♀ ♀, July 4; 5 ♀ ♀, July 7; 36 ♀ ♀, July 12; 1 ♀, July (Box closed August 5); 1 ♀, July (Box closed August 5).

*Although the specimens of Ichneumonidæ did not bear any labels as to the precise dates of capture, it is worth noticing that the boxes containing the insects were closed for shipment on August 5.

V. MALLOPHAGA FROM BIRDS OF SOUTHAMPTON ISLAND, HUDSON BAY

By HAROLD S. PETERS.

U. S. BUREAU OF ENTOMOLOGY, WASHINGTON, D. C.

In the following list there are recorded twenty-four species of Mallophaga taken from the feathers of twenty-four species of birds collected by George Miksch Sutton during his study of the birds of Southampton Island from August, 1929, to August, 1930. Most of the birds were collected within a radius of about fifty miles of the Post of the Hudson's Bay Company, which is situated on Coral Inlet, on the southern coast of Southampton Island.

The Mallophaga were not picked from the bird-skins until after they had been received at the Carnegie Museum in the fall of 1930. It followed that numerous cases of error as to the hosts were found, due to the migration of the lice from one freshly killed bird to another in close association. The number and sex of the lice from each bird obviously cannot be recorded. In the following list I have not included these "straggling" records, but only those, which I feel sure represent natural parasites of the hosts listed. There are several interesting new records of hosts.

The material is deposited in the Carnegie Museum and the U. S. Bureau of Entomology.

Order MALLOPHAGA Nitzsch.

SUBORDER AMBLYCERA Kellogg.

Family MENOPONIDÆ Mjoberg.

Genus MENOPON Nitzsch.

1. *M. infrequens* Kellogg.

From three Parasitic Jaegers, *Stercorarius parasiticus* (Linn.) and one Long-tailed Jaeger, *Stercorarius longicaudus* Vieillot.

Genus MYRSIDEA Waterston.

2. *M. brunnea* (Nitzsch).

From Northern Raven, *Corvus corax principalis* Ridgway.

Genus ACTORNITHOPHILUS Ferris.

3. *A. crocatus* (Nitzsch).

From Hudsonian Godwit, *Limosa hamastica* (Linn.).

Genus TRINOTON Nitzsch.

4. *T. anserinum* (Fabricius).

From Whistling Swan, *Cygnus columbianus* (Ord).

SUBORDER *ISCHNOCERA* Kellogg.

Family PHILOPTERIDÆ Burmeister.

Genus GONIODES Nitzsch.

5. *G. mammillatus* Rudow.

From Rock Ptarmigan, *Lagopus rupestris rupestris* (Gmelin) and White-shafted Ptarmigan, *Lagopus lagopus leucopterus* Taverner.

Genus LIPEURUS Nitzsch.

6. *L. protervus* Kellogg.

From Rock Ptarmigan, *Lagopus rupestris rupestris* (Gmelin) and White-shafted Ptarmigan, *Lagopus lagopus leucopterus* Taverner.

Genus PHILOPTERUS Nitzsch.

7. *P. conicus* (Denny).

From Golden Plover, *Pluvialis dominica dominica* (Müller).

8. *P. gonothorax* (Giebel).

From two Herring Gulls, *Larus argentatus smithsonianus* Coues.

9. *P. procax* (Kellogg & Chapman).

From Mandt's Guillemot, *Cephus grylle mandti* (Mandt).

10. *P. pustulosus* (Nitzsch).

From Pomarine Jaeger, *Stercorarius pomarinus* (Temminck).

Genus ANATECUS Cummings.

11. *A. dentatus* (Scopoli).

From Greater Scaup, *Nyroca marila* (Linn.) and King Eider, *Somateria spectabilis* (Linn.).

12. *A. obtusus* (Giebel).

From Old-squaw, *Clangula hyemalis* (Linn.) and King Eider, *Somateria spectabilis* (Linn.).

Genus EUSTRIGIPHILUS Ewing.

13. *E. ceblebrachys* (Nitzsch).

From three Snowy Owls, *Nyctea nyctea* (Linn.).

Genus DEGEERIELLA Neumann.

14. *D. actophila* (Kellogg & Chapman).

From Semipalmated Sandpiper, *Ereunetes pusillus* (Linn.).

15. *D. atrimarginata* (Kellogg & Chapman).

From Sabine's Gull, *Xema sabini* (Sabine).

16. **D. complexiva** (Kellogg & Chapman).

From Ruddy Turnstone, *Arenaria interpres morinella* (Linn.).

17. **D. euprepes** (Kellogg & Chapman).

From Ruddy Turnstone, *Arenaria interpres morinella* (Linn.).

18. **D. fusca** (Nitzsch).

From White Gyrfalcon, *Falco rusticolus candicans* Gmelin.

19. **D. maritima** (Kellogg & Chapman).

From Brännich's Murre, *Uria lomvia lomvia* (Linn.).

20. **D. normifer** (Grube).

From two Parasitic Jaegers, *Stercorarius parasiticus* (Linn.) and Long-tailed Jaeger, *Stercorarius longicaudus* Vieillot.

21. **D. opaca** (Kellogg & Chapman).

From Semipalmated Plover, *Charadrius semipalmatus* Bonaparte.

Genus ORNITHOBIUS Denny.

22. **O. goniopleurus** Denny.

From Hutchins' Goose, *Branta canadensis hutchinsi* (Richardson).

Genus ESTHIOPTERUM Harrison.

23. **E. crassicornis** (Scopoli).

From three Northern Eiders, *Somateria mollissima borealis* (Brehm); two King Eiders, *Somateria spectabilis* (Linn.); two Hutchins' Geese, *Branta canadensis hutchinsi* (Richardson); one American Brant, *Branta bernicla hrota* (Müller); and one Whistling Swan, *Cygnus columbianus* (Ord).

24. **E. modestum** (Giebel).

From two Parasitic Jaegers, *Stercorarius parasiticus* (Linn.) and one Pomarine Jaeger, *Stercorarius pomarinus* (Temminck).

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1929-1930

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II. LEPIDOPTERA.

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I. ECHINODERMATA AND MOLLUSCA

BY STANLEY T. BROOKS

The material brought from Southampton Island by Dr. George M. Sutton, in so far as it represents the Echinodermata and Mollusca, is more or less fragmentary. In view of all which he accomplished along other lines, it is remarkable that he found time to make even the small collection, which has been submitted to me for study and determination.

Inasmuch, so far as I am able to ascertain, as no material whatever representing the Echinoderms and Mollusks of this island has been hitherto reported, I take pleasure in listing the species represented in the avowedly small and incomplete collection which Dr. Sutton made.

Most of the species are common circumpolar forms. Many of the specimens are beach-drift or fragments taken from the gizzards of birds. They have been identified by comparison with specimens collected on the eastern coast of North America, Greenland, and northern Europe, which are in the Carnegie Museum. I wish to thank Dr. H. A. Pilsbry and his associate, Mr. E. G. Vanatta, of the Academy of Natural Sciences in Philadelphia for the identifications credited to them in the following list.

ECHINODERMATA

Genus *STRONGYLOCENTROTUS* Brandt.

1. *Strongylocentrotus droebachiensis* (O. F. Mueller).

One broken test evidently found upon the beach at Coral Inlet.

MOLLUSCA.

PELECYPODA.

1. *Mytilus edulis* Linnæus.

Six valves in good condition.

2. *Pecten islandicus* (Muller).

Eight valves.

3. *Modiolaria discors* (Linnæus).

One specimen identified by Pilsbry and Vanatta.

4. *Saxicava arctica* (Linnæus).

Nine valves.

5. *Mya truncata* Linnæus.

Two left valves, heavier and smaller than the material with which comparison has been made. Length 40 mm.; height 31 mm.

6. *Astarte borealis* Schumacher.

Identified by C. G. Vanatta. The specimen was found by Dr. O. E. Jennings among some mosses sent in by the collector.

In addition to the species hereinbefore listed there were a number of fragments of *Pelecypoda* taken from the gizzard of a King Eider, which are indeterminate.

GASTROPODA.

7. *Colus kroyeri* Møller.

One fragment identified by Pilsbry and Vanatta.

8. *Margarita umbilicalis* Broderip and Sowerby.

One specimen.

9. *Acmæa testudinalis* (Linnæus).

One specimen of the typical shape and size. One specimen of a more flattened form, the dimensions of which are: height 5, length 17, width 12 mm.

10. *Buccinum ciliatum* Fabricius.

Two specimens, one a fragment, identified by Pilsbry and Vanatta.

11. *Buccinum cyaneum* Brugiere.

One specimen identified by Pilsbry and Vanatta.

12. *Littorina rudis tenebrosa* Montagu.

From gizzard of Arctic Curlew.

II. THE LEPIDOPTERA COLLECTED BY G. M. SUTTON ON SOUTHAMPTON ISLAND

RHOPALOCERA.

By W. J. HOLLAND AND A. AVINOFF.*

Of course the main object of Dr. Sutton's stay on Southampton Island was to make as thorough an investigation of its birds as the time at his command permitted. He, however, did not fail to make collections in other orders and paid attention to the earnest request of the senior author of the pages, which immediately follow, to collect such butterflies as might come under his observation.

Dr. Sutton's collection of the diurnal lepidoptera, while not very extensive, is upon the whole one of the most complete which has thus far been made in that part of the world, and in fact is the only collection which has come from the great island which he went to explore.

The collection brought back by Sutton contains no representation of the *Papilionide* and the *Hesperiidae*. Whether these families are not represented upon the island must of course remain more or less a matter of conjecture. The probability is that they do not occur upon the island, thus proving its more truly arctic character than lands lying to the west in even higher latitudes. Both in its fauna and its flora Southampton Island shows closer likeness to Baffinland and the islands and peninsulas lying northward than to the Northwest Territories and Alaska, the climate of which, except in the extreme north, is more or less softened by "the Chinook winds," blowing in from the vast expanse of the heated waters of the Kuro-Shiwo, which corresponds in the Pacific to the Gulf-stream in the Atlantic.

Without further preliminary observations I proceed to the enumeration and description of the species brought by Sutton from the Island, which his investigations have done so much to bring to our knowledge.

Family NYMPHALIDÆ.

SUBFAMILY NYMPHALINÆ.

Genus BRENTHIS Hübner.

Of this genus Sutton collected representatives in excellent condition of four species.

1. *B. butleri* (Edwards). Pl. XXVIII, figs. 4-6.

Argynnis butleri Edwards, Canad. Entom., XV, (1883), p. 32.

Brenthis butleri (Edwards) Holland, Butt. Book (Rev. Ed.) 1931, p. 109, Pl. LV, figs. 17-19.

*The initial part of the manuscript by Dr. Holland was preserved as far as possible in the same state as it was before he passed away, this paper being the last scientific writing left by him. My task was to continue and conclude the article embodying the views which I was privileged to exchange with the deceased dean of American lepidopterists and in which we were in full accord.

For the portion of this article on Lepidoptera dealing with the genus *Colias*, Dr. Holland prepared only preliminary notes in which he incorporated some of the discussions we had on certain involved taxonomic questions pertaining to this group, and to the affinities of the American and Eurasian forms. A. A.

Of this well marked species, Mr. Sutton secured in beautiful condition eighteen specimens, thirteen males and five females. They were captured on dates ranging from August 1 to August 3, fourteen of the species having been taken on the latter date. They appear to have all been taken at, or in the vicinity of, Coral Inlet, upon which the Post of the Hudson's Bay Company is located. They display remarkable uniformity. This species has been treated as a synonym of *chariclea* by Elwes and others who have followed him.

Brenthis (Argynnis) chariclea was originally described by Schneider from subarctic Europe. I have before me, as I write, a very extensive series of specimens, partly determined by the veteran lepidopterist of Europe, the late Otto Staudinger, which represents the insect as it occurs in Lapland and elsewhere in its range in the Old World. I have also a large suite of specimens taken at Ramah, the Moravian mission-station in northern Labrador. All these specimens appear to quite closely agree, with the markings of the lower sides more obscure than is the case with typical *B. bulleri*, in which the upper sides of both the primaries and secondaries are broadly dark brown or blackish on the inner two-thirds, while the characteristic spots of the lower side of the secondaries are brightly silvered, which does not appear to be the case in the European and Labradorian examples of *chariclea* before me.

It may be of interest at this point to summarize the account given by the late R. McLachlan of his study of the specimens collected by Captain H. W. Feilden and Mr. Hart in the voyage of the "Alert" and the "Discovery" toward the North Pole. It is to be found in the *Journal of the Linnean Society of London, Zoölogy*, XIV, 1879, pp. 109-111.

A CHARICLEA, Schneider.

Under this head are grouped twenty examples from various localities, "ranging from lat. 79° to 81° 52' N. (Feilden and Hart). The places indicated by name are Hayes Sound, Port Foulke, Walrus Island, Franklin-Pierce Bay, Cape Hayes, and Discovery Bay. Never before have I been so perplexed over a series of any insect of which I had made a serious study. Without exaggeration I may safely say that no two of the twenty individuals are precisely alike; and the extremes present numerous discrepancies." Not one example precisely resembles specimens of the typical *Chariclea* of Northern Europe also subject to considerable variation, "and a comparison of the rather numerous figures of it only added to my perplexity, for no two agree. A visit to the British Museum in order to consult the materials obtained from previous Arctic Expeditions did not in the least help me; for I found just as much uncertainty existing in the arranged collection as in my own mind. The upperside of the insects is subject to great variation, but in a measure that cannot be compared with that presented by the underside of the posterior wings, which is usually considered as furnishing the surest characters in *Argynnis*. I essayed an examination of the anal parts of the males (which I am convinced will often serve to distinguish allied species in Butterflies), but found that it would be necessary to have the insects in a fresh state (or in fluid) if any reliable characters were to be sought in these parts.

"It would be utterly useless to attempt to describe the forms; the only thing that could be of service would be to give coloured figures of both sides of nearly every example. Some of them may perhaps resolve themselves into *arctica* of Zetterstedt and *Boisduellii* of Duponchel, now both grouped with *Chariclea*. There is, however, one extreme individual that I propose to briefly notice by name.

"ARGYNNIS CHARICLEA, var. *obscurata*.

"Wings above smoky greyish-fulvous, the basal portion very densely clothed with long brownish-grey hairs, having a bluish or greenish reflection in certain lights: in the anterior

pair the basal third is blackish, the black markings all distinct, the post-median zigzag line complete and rather broad, the submarginal series of spots very large, the border broad, the fringes dirty cream-colour interrupted with blackish; in the posterior wing more than the basal half is blackish, almost confused with the median band, the submarginal series of spots distinct and ordinary, the border surmounted by a series of triangular spots, fringes as in the anterior but less interrupted. Underside—ground-colour of anterior wings brighter; of the discocellular spots only the angulate one and that at the end are distinct; zigzag band distinct, but narrow; submarginal series of spots very indistinct; in the posterior wings the basal half is dark brown, inclosing the median band of pale spots, which is very broad, all the spots more or less coalescent and dirty cream-colour; the outer edge of the dark basal portion margined with a narrow whitish line, the space between this and the border light greyish brown, with scarcely any indication of the submarginal series of spots; border broad, dirty cream-colour, surmounted by triangular dark brown spots. Legs . . . greyish.

"There is one ♀ of this from 81° 42' N. Another specimen in the British Museum from the voyage of the 'Enterprise,' somewhat resembles it, differing principally in the middle spot of the median band of the underside of posterior wings being more produced externally, a point in which great variation is exhibited in all the insects.

"In concluding my remarks on the twenty examples referred to *A. Chariclea*, I will only say that, so far as I can see, no two entomologists would probably agree as to the number of so-called species comprised therein, nor do I hope for any immediate settlement of the difficulty. Either there is only one species, or there are several; and in favour of the latter hypothesis it might be argued that we in England have species as closely allied as *A. Euphrosyne* and *A. Selene*, which we know, from habits, &c., to be perfectly distinct; yet each of these has modified forms in northern and alpine districts."

Some years after McLachlan had published the foregoing account of the specimens collected on the voyage of the "Alert" and the "Discovery," William H. Edwards sent to Dr. Arthur G. Butler at the British Museum the specimen of which the under side is shown in the revised edition of *The Butterfly Book*, Pl. LV, fig. 19. This had been taken by E. W. Nelson at Cape Thompson in northwestern Alaska and had been identified, as being the same as a female taken at Kotzebue Sound by the same collector. The female is in the Edwards collection, but, being a somewhat tattered specimen, I did not use it in making the figures given in the new edition of *The Butterfly Book*. Butler in replying to the inquiries of W. H. Edwards said: the specimen "differs from *Chariclea* in the redder coloration, and much heavier markings on the upper surface; the basal area is blacker, the spots and stripes much thicker. Below, the markings are altogether darker than in *Chariclea* of Europe. Your example agrees perfectly with a specimen (in Br. Mus. Col.), labelled Nova Zembla, and with two of the Grinnell Land series, included under McLachlan's varieties of *Chariclea*. It is in my opinion worthy of a distinct name."

Accordingly W. H. Edwards described the insect as *Argynnis butleri*, naming it after his learned correspondent in London.

Other specimens than the two taken by Nelson subsequently came into the possession of W. H. Edwards, and two of these are figured by me in the revised edition of *The Butterfly Book*. Now comes the remarkable series of eighteen almost absolutely perfect specimens of the species collected by Sutton on Southampton Island, revealing that we are dealing with a perfectly constant form.

I may here state that of several hundreds of examples of *B. chariclea* before me as I write, coming from Labrador, Europe, and Asia, not one corresponds with the form of the insect which is shown upon our plate, and with the types of Edwards. Judging from the

material which I have seen, it is quite proper to designate this insect as representing a valid species, rather than a subspecies of *B. chariclea*.

The insect ranges from Southampton Island northward and westward in the more rigorous regions of Arctic America, and according to Butler also occurs in Nova Zembla. It is in its habitat the northernmost representative of the great family to which it belongs.

2. *Brenthis frigga* (Thunberg). Pl. XXVIII, figs. 1-3.

Argynnis frigga Thunberg, Diss. Ins. Suec., 233, 1791.

Argynnis frigga var. *saga* Staudinger, (Kaden MS.) Stett. Ent. Zeit., XXII, 1861, p. 350; Holland, Butt. Book (Rev. Ed.) 1931, 110, Pl. XV, figs. 13-14.

In the Revised Edition of The Butterfly Book as above cited I said: "Typical *frigga* described from subarctic Europe and Asia apparently does not occur in our fauna. The variety *saga* Staudinger is, however, not uncommon."

Since publishing the foregoing lines I have had occasion to examine a very large number of specimens collected in all parts of arctic America and on the alpine peaks of the western mountain ranges, and am led as the result to modify the foregoing statement. The variety *saga*, originally founded by Staudinger upon specimens coming from Labrador in the Collection of Dr. Kaden, and which is well represented in the figures above cited, seems to be the prevalent form in Labrador, whence I have a long series; and it occurs also upon the high mountains of the Western States and in the region of the lower Yukon Valley. Its differentiating feature is the more or less complete obscuration of the mesial band of light spots on the under side of the secondaries. In the four specimens collected by Sutton on Southampton Island from July 12 to August 1 the mesial band is not obscured, but is prominent as in typical *frigga* represented in my collection by specimens from subarctic Europe, some of them determined by the late Dr. Staudinger, the author of the subspecies or variety *saga*. In a long series which we have from the upper valley of the Yukon (elevation 2,000 ft.) similar specimens occur. The specimens we have from the lower Yukon near its mouth, are more like the specimens from Labrador, taken near sea-level.

From the foregoing it seems to be apparent that the difference between typical *frigga* and its variety *saga* is climatic.

3. *Brenthis improba* (Butler). Pl. XXVIII, figs. 9-11.

Argynnis improba Butler, Ent. Mo. Mag., XIII, 1877, p. 206.

Brenthis improba Holland, Butt. Book, (Rev. Ed.) 1931, p. 111, Pl. LV, fig. 27; Pl. LIX, fig. 23; Pl. LX, fig. 12, *underside*.

Of this species Sutton collected in beautiful condition four males and two females at dates ranging from July 22 to August 3. They agree well with the specimens figured in the new edition of The Butterfly Book. Schoyen (Ent. Tidschr., VI, 1885, p. 142) and Elwes (Trans. Ent. Soc. Lond., 1889, p. 540), followed by Gibson (Can. Arctic Exped., 1913-18, Vol. III, Pt. I, p. 24) treat this as a variety of *B. frigga*, which is not correct. It represents a valid species found on the wing on Southampton Island at the same time as typical *frigga*, from which it is entirely distinct.

It is a truly arctic species, found at high latitudinal or vertical elevations in the far north, so far as has been ascertained, which is instantly recognizable by the markings of the lower side of the secondaries, which are quite different from those of *frigga*, with which Schoyen and Elwes confounded it. So far as is known, this species does not occur so far

south as Labrador. It ranges from Southampton Island eastward and northward to Baffin Island, and thence northward and westward at high elevations in the Yukon region to the borders of the Arctic Ocean. With the exception of *B. butleri* it is the northernmost of the *Nymphalidae* in its range. It must not be confounded with the obscurely marked specimens of *frigga* found in Lapland to which Bryk has given the subspecific name *improba*.

4. *Brenthis polaris* (Boisduval). Pl. XXVIII, fig. 7.

Argynnis polaris Boisduval, Europ. Lep. Index Method., 1829, p. 15.

Brenthis polaris Gibson, Can. Arct. Exped., 1913-18, Vol. III, 1920, p. 23i; Pl. V, figs. 2-4; Holland, Butt. Book (Rev. Ed.), p. 110, Pl. LV, fig. 12.

Of this well marked and widely distributed species, Sutton collected thirteen specimens in excellent condition, seven males and six females ranging in the dates of capture from July 2 to July 22, the largest number, seven, being recorded as taken on July 8th.

The specimens do not appear to differ in any respect from examples in our possession from northern Europe and Asia.

SUBFAMILY SATYRINÆ.

Genus *ŒNEIS* Hübner.

5. *Œneis arctica* Gibson. Pl. XXVIII, figs. 12-15.

Œneis semidea var. *arctica* Gibson. Can. Arct. Exped., 1913-18, Vol. III, p. 11i, Pl. XXX, II, fig. 4; Pl. IV, fig. 4; genitalia, Pl. I, fig. 4.—Holland, Butt. Book (Rev. Ed.) 1931, p. 200, Pl. LXXXII, fig. 5 (after Gibson).

Gibson designated this insect as a variety of *Œ. semidea* (Say).

I am, after studying the material before me, inclined to give the insect full specific rank. Sutton returned one female, taken on July 5, and five males ranging in their dates of capture from July 3 to July 28. They all agree closely with each other on the upper and lower sides and in having the fringes white except at the outer terminations of the nervules. The latter feature separates them very distinctly from typical *Œ. semidea* (Say). Of over sixty specimens of *Œ. semidea* from the White Mountains of New Hampshire, which I have examined carefully, only two reveal a slight trace of whitening of the fringes and this only for a fractional part of the wings, whereas all of the specimens from Southampton Island possess this as a marked and conspicuous feature. One specimen in the collection of W. H. Edwards labelled "*semidea*" is identical with these specimens received from Sutton, but it is from Ungava, at the northernmost part of Labrador, and is unmistakably referable to *Œ. arctica* Gibson. Besides the well marked distinction of the white fringes separating this species from *Œ. semidea* it is evident that all these specimens differ from typical specimens of the latter species in the form of the primaries which are more acute at the apex, and less rounded on the outer margin, and, as pointed out by Gibson, without the contrast in the maculation of the underside of the secondaries, which is prevalent in specimens from the high mountains of New Hampshire.

Genus *EREBIA* Dalman.

6. *Erebia rossi* (Curtis). Pl. XVIII, figs. 16-18.

Hipparchia rossi Curtis. Ross' Second Voyage, Appendix, 1835, p. lxxvii, Pl. A, figs. 7, 8.

Erebia rossi Gibson. Can. Arct. Exped., 1913-18, Lepidoptera (1920) pp. 17i, Pl. IV, fig. 9.—Holland, Butt. Book (Rev. Ed.) 1931, p. 203, Pl. LXXXIII, figs. 3-4.

Of this species Sutton returned five examples, three males and two females, taken in the latter half of the month of July. They are absolutely typical specimens, and the males might have been used by the artist to prepare the original figure of the species published nearly one hundred years ago. Two of these specimens, a male and a female, were used by me in illustrating the species in the revised edition of The Butterfly Book, as above cited.

The range of this species, including its varieties, is wide; but the typical form is confined to the more strictly arctic lands, lying north of Hudson Bay, west of Davis Strait, and the eastern portion of the Yukon Region. Westwardly it is replaced by the variety *kuskoquima* Holland.

Family LYCÆNIDÆ.

SUBFAMILY CHRYSOPHANINÆ.

7. *Chrysophanus feildeni* McLachlan. Pl. XXVIII, figs. 19-21.

Chrysophanus phlocas, var. *feildeni* McLachlan. Journ. Linn. Soc. Lond., Zool., Vol. XIV, 1878, p. 111.

Heodes hypophlaeas feildeni Gibson, Can. Arct. Exped., 1913-18, (1820) p. 27i.

Chrysophanus feildeni (Misprint *fieldeni*) Holland, Butt. Book (Rev. Ed.) p. 251, Pl. LXVIII, figs. 5-6.

We received from G. M. Sutton ten specimens of this species, six males and four females, most of which were taken on August 1st, but two are labelled as captured on August 5th. Two of these specimens are shown as above cited, on Pl. LXVIII of the new edition of The Butterfly Book.

The specimens agree perfectly with the original description given by McLachlan. In the females the spots on the upper side of the primaries are smaller and much less distinct than in the males, and indeed in the case of the spot near the inner angle between the inferior vein and the first submedian complete obsolescence in one of the females before me occurs, while in the others this spot is barely distinguishable. As pointed out by both McLachlan and myself the red ground-color of the primaries is quite different from that in *C. hypophlaeas*, being as McLachlan says "brassy," or, I prefer to say, with lustrous metallic golden reflections. In this respect the species differs greatly from *C. hypophlaeas*, as well as in other respects.

The distribution of this insect is strictly speaking arctic, and, so far as we know, it occurs north of Hudson Bay, west of Davis Strait, and ranges northward and westward from Southampton Island to the eastern borders of the Mackenzie Drainage.

SUBFAMILY LYCÆNINÆ.

Genus LYCÆNA Fabricius.

(Subgenus *Agriades* Hübner).

8. *Lycaena* (*Agriades*) *aquilo* (Boisd.) var. *suttoni* Holland. Pl. XXVIII, figs. 22-25.*

Argus aquilo Boisduval, Icones, 1832, p. 62, Pl. 12, figs. 7-8.

Polyommatus franklinii Curtis, Ross' Second Voyage, Appendix, 1835, p. lxix, Pl. A, figs. 8-9.

Lycaena aquilo var. *suttoni* Holland, Butterfly Book, (Rev. Ed.), 1931, p. 269, Pl. LXVIII, figs. 7-9.

*The specimen of ♂, fig. 22, shows an exceptionally wide dark margin; it was erroneously figured as ♀, type, on pl. LXVIII, fig. 8, Holl. Butt. Book, 1931. A. A.

The name *aquilo* (Boisd.) has priority over *franklini* (Curtis), Staudinger and Rebel to the contrary notwithstanding (Cf. Catal. d. Lep., p.81). In the original description Boisduval cited as the localities where the species occurs "the North Cape, the Altai Mountains of Siberia and Labrador." Later writers have restricted the form, treated by them as a variety of *orbitulus* (auct.), which it is not, to "arctic America and Labrador."

I have before me a considerable series of specimens, some of them determined by the late Dr. Otto Staudinger, all coming from Labrador, which agree perfectly with the description and figures given by Boisduval. The figure of the lower side of the wings given by Curtis materially differs from that of Boisduval in that the outer third of both wings is shown by Curtis as prevalently lighter, with the spots and lines less accentuated, and the medial band or elongated spot on the secondaries running from the outer end of the cell toward the costa much more extended than is the case in all specimens of *aquilo* from Labrador, which I have seen, and more like the configuration of the same spot in the variety *suttoni*.

Sutton collected twelve males and six females* of the form I have named after him. The dates of capture range from July 28 to August 5. They all closely agree in their markings, and differ greatly from the insects described and figured by Boisduval and Curtis. The most distinctive feature of this subspecific form is the intensification and sharp definition of the dark spots on the underside of the secondaries, forming a dark brown or black marginal border and a black band running from the lower or outer end of the cell to the costa. The inner half of the wing is dark brown, almost black, upon which the light spots stand out sharply defined, and not semi-obscure as shown in typical examples of *aquilo* (Boisd.) and in the figure of *franklini* given by Curtis.

Family PIERIDÆ.

Genus COLIAS Fabricius.

The generic name *Eurymus* Horsfield, which was a "manuscript name" suggested to Horsfield by Swainson, and published by the former in 1827, with *hyale* as the type, was at the time preoccupied in the Coleoptera by Rafinesque, as is pointed out by Sherborn. *Eurymus* is untenable as a generic name in the Lepidoptera, and the name *Colias* Fabricius, the type of which was designated as *hyale* by Leech in 1815, twelve years before Horsfield's publication, should stand. (See Holland, Ann. Car. Mus., Vol. XIX, pp. 198-200).

The only representatives of the family Pieridæ brought from Southampton Island belong to the genus *Colias* of which Sutton returned one hundred and fifteen specimens taken by him at dates ranging from July 3 to August 5, and a solitary female taken at Coral Inlet on August 24th said by the Factor, Mr. Ford, to be an "unusually late date for the appearance on the wing of a butterfly."

The series of representatives of the genus *Colias* secured by Dr. Sutton is a most valuable assemblage of biological documents shedding a new light on the systematic relationship of *Colias nastes* Boisduval, *boothi* Curtis, and *hecla* Lefevre. The forms which belong to the systematic entities conventionally considered by students of Lepidoptera as three distinct species are characterized by a gradation in coloration and pattern running through the complete set of individuals. The whole picture as it is revealed by the material of *Colias* from Southampton can be summarily stated as follows:

*The female of *suttoni* is shown for the first time on Plate XXVIII, figs. 23 and 25. A.A.

1. The larger proportion of the specimens belong to a local race of *nastes*, the identity of which will be subsequently discussed, and denote an unusual variability. Ranging from a greenish yellow tinge of the male and grayish white of the female these constitute a series of imperceptible gradations to forms increasingly tinted with a more definite orange. In the most extreme specimens the orange tint exceeds the saturation typical in the form *rossi* and leads gradually to an approximation of the coloration of the so-called *boothi*. This whole series of variable forms of *nastes*, including in part *rossi*, is by far the most numerous representative of the genus on the Island.

2. A smaller portion of the whole set of *Colias* from the Island is a beautiful series of *boothi* showing intergradation toward the race of *nastes*, specifically toward *rossi*, and on the other hand with a sporadic and less continuous transition toward *hecla*. The females form a more complete chain of connecting links between *rossi* and *boothi*.

3. A stable, not numerous, set of typical *Colias hecla*.

Such are the characteristic features disclosed by the material of Sutton and may suggest in a natural way a hypothesis of cross-breeding between the extreme links of the sequence with the possibility of primary and secondary hybridization. An observer of the whole series cannot fail to be impressed not only by the fact of a successive merging of three species usually considered as separate, but also by the uneven intergrading and relative stability of certain portions of this gamut of forms.

A student of this telltale lot is convincingly driven to a theory of surmising interbreeding although it will remain the task of future investigators to prove this conjecture by actual experiments.

The chief problems arising out of the study of the Southampton material of *Colias* involve: (1) the systematic position of the special race of *Colias nastes* found on the Island as compared with other American and Palearctic kindred representatives of the group; (2) the taxonomic status of *C. boothi*; and (3) the more general question of the concept of a species as a taxonomic term applicable to the genus *Colias*.

These problems will be treated in conjunction with the question pertaining to the actual specimens secured on the Island. The result of the study of the material may be stated in the following more detailed exposition.

9. *Colias nastes* Boisduval. Pl. XXVI, figs. 1, 1a; Pl. XXVII, fig. 36.

This species was originally described from specimens obtained from North Cape, Iceland, and Labrador. It has been almost the universal custom among writers to refer specimens from the Arctic region of Europe to *nastes* var. *verdandi* Zetterstedt (Ins. Lapp., 1840, p. 908). As Dr. McDunnough mentions in the Canadian Entomologist, Vol. 60, No. 11, p. 270, "subsequent authors have been unanimous in considering the Labrador race to be the typical one, the rather crude colored figure fitting in better with Labrador specimens than with the paler European ones."

The customary usage may be erroneous from the point of view of specific affinities. While it is indeed true that *Colias verdandi* in some respects resembles *Colias nastes* from Labrador, they are not identical and *verdandi* could be treated as a separate species in the same sense and on similar grounds as *melinos* is separated specifically from its European relative; conversely the Labradorian insect to which by common consent the specific name *nastes* is attached should be regarded as distinct. Such a procedure would also dismiss a nomencla-

torial complication which rises from the fact that *werdandi* was described before *nastes* and would imply a subspecific position for *nastes* if the two forms were to be looked upon as conspecifically related.

In the investigation of the affinities among the various related races of the *nastes* circle various sources of information have been consulted with the aid of qualified authorities in different museums, to whom the most sincere gratitude is expressed herewith for a most helpful assistance.

There is in the Barnes Collection, now the property of the United States National Museum, a male specimen from Labrador which belonged to Dr. Boisduval and passed into the collection of the late M. Charles Oberthur, from which the late Dr. Barnes obtained it with many other of Boisduval's types. This specimen is figured on our plate XXVI, figs. 1 and 1a. The specimen has been accepted by Höfer as one of the types of *nastes* in the sense of multiple types set aside as such by earlier authors of descriptions, and according to F. H. Benjamin absolutely agrees with Boisduval's description.

A male and female, from Nain, Labrador, are figured in The Butterfly Book, Pl. XXXVI, figs. 11 and 12. These figures do not agree absolutely with the figures given by Boisduval in his *Icones*, Pl. 9, figs. 4 and 5, but nevertheless they have been accepted as typical by Staudinger, Verity and other authors. They represent the form of the species which prevails along the sea-coast of Labrador, where are located the Moravian Missions, from which there came to Europe almost all of the Labradorian material studied by earlier writers in the first half of the Nineteenth Century. The figures given by Boisduval are somewhat crude, and do not agree very closely with his types.

Accepting the specimen from the Barnes collection as the type of *C. nastes*, it will be noted that on the under side there is almost an entire absence of the dark antemarginal spots and of the darkening of the inner two-thirds of the secondaries which reveal themselves for example in *subarctica* McDunnough (See Pl. XXVI figs. 6a and 7a) from the eastern coast of Hudson Bay; in 8a, which represents the under side of what is accepted as the type of *Colias rossi* Guenée, and in 14a and 15a, which represent the male and female types of *Colias moina* Strecker, now preserved in the Field Museum of Natural History in Chicago. The insect figured on Pl. XXVI, figs. 1 and 1a, being the type of *C. nastes* Boisduval, represents a form which is abundant on the eastern coast of the peninsula of Labrador. This typical form seems to be largely confined to that region. A varietal form occurs on the high mountain peaks about Laggan, Alberta. This western form is represented on Pl. XXVI, figs. 2 to 5a, both the upper and lower sides being given. It has been named *C. nastes* var. *streckeri* by Groum-Grshimailo. While not appreciably differing on the under side from typical *C. nastes*, which occurs upon the coast of Labrador, it may be separated by the greater intensity and diffusion of the dark markings upon the upper side of the wings. The specimen figured on Pl. XXVI, figs. 5 and 5a is designated by F. H. Benjamin in the Barnes collection as the aberration of *streckeri* named *obscurata* by Verity. This attribution should be accepted within a certain latitude of individual variability since a reference to Verity's work (Rhop. Pal., p. 355, Pl. LXXI, fig. 6) shows that Verity's *obscurata* is a singularly aberrant specimen in which the dark greenish scales have completely covered the primaries, while the secondaries are almost white. The text-figure is a reproduction of Verity's figure of the type of his *C. nastes* ab. *obscurata*, which according to Verity was taken near Lake Louise, Alberta.

The variety *streckeri* occurs at Laggan, Alaska and high levels. Specimens from the north of Alaska, namely from Kotzebue Sound and the regions eastward are almost identical

with *streckeri* and may be ascribed to the race *alaska* O. Bang-Haas, figured on Pl. 5, figs. 24-25 of Horæ Macrolepidopterologicae. The type specimen of Bang-Haas was taken at Rampart, Alaska. Specimens from Nome, Alaska, in the Hall collection are identical with the type of Bang-Haas. Both *streckeri* and *alaska* may be accepted as races of *nastes*, but can scarcely be identified as being conspecific with *verdandi*.*

Proceeding with the revision of varietal forms of *nastes*, one should note that the study of the figures given by Verity (Rhop. Pal., Pl. LXXI, figs. 8, 9) shows that these specimens stated to be "*C. nastes* from the Barren Lands" are in all probability *C. moina* Strecker.

Dr. McDunnough described under the name of *subarctica* the race of *nastes* which is characterized as follows: "Corresponding to the form *obscurata* of *streckeri* a very similar dark form is the dominant one along the northern coast; in the long series brought back by the Canadian Arctic Expedition from Bernard Harbor only one or two specimens at all approach the Labrador *nastes* in coloration of upper side; the males are heavily suffused with black on the primaries with the submarginal row of pale spots generally well developed; the secondaries show much less of the black suffusion. On the underside the secondaries are also suffused, the color of the entire disk being a dark smoky green with a paler terminal band which at times contrasts very sharply with the remainder of the ground-color. The females show a similar smoky suffusion but it is scarcely so pronounced, there being more or less of a pale yellow-green ground color visible, as well as the similarly colored submarginal spots. On the underside of the secondaries however, the suffusion is heavy, the entire disk at times being almost blackish with a pale orange-yellow terminal band which, at times, as in the ♂ sex, may stand out sharply." A male, captured at Bernard Harbour, N.W.T., August 9, 1915, is shown on pl. XXVI, fig. 6.

In northern Asia the species named *C. melinos* Eversman and several varieties, or subspecies, occur. In its range *C. melinos* replaces *C. verdandi* Zetterstedt, from which it is sufficiently distinct. This species in its habitat wholly supplants *verdandi* of the Arctic regions of western and northern Europe. Guenée in his description of *C. rossi* claims that the latter cannot be identified with *C. melinos*. This view is quite correct because of the character of the under side of both wings and the different color of the upper side of the wings.

In central Asia at various localities there occurs the species *Colias cocandica* Erschoff, which, while in some respects resembling *C. verdandi* and *nastes* in many respects is nevertheless distinct from them. The under side of the wings is not immaculate, as in *nastes* (save for the discal spot in *nastes*), but marked by antemarginal dark spots on the primaries, which are continued and more or less profoundly accentuated on the secondaries, while the inner two-thirds of the secondaries are darkly colored. This species more nearly resembles on the under side the insect named *Colias rossi* Guenée. Furthermore it might be mentioned that there is marked resemblance both in maculation and coloration between the insect so abundant on Southampton Island and the insect occurring at high elevations in Thibet known as *Colias elwesi* Röber (syn. *leechi* Elwes). The resemblance is very close on the under side. *C. elwesi* Röber is accepted by some students as an alpine variety of *C. cocandica*, others regard it apparently with better reason as an independent species. There is, however, a clear diacritical difference in the fringes: those of *elwesi* being greenish gray, those of the North American insect being more or less pinkish.

Attention is now called to the fact that not a single specimen of typical *C. nastes* Bdv.

*If a broader view is taken in widening the limits of the *nastes* circle as one species on the grounds of a lack of stable structural differences, one should merge into one specific entity the whole group of *melinos*, *cocandica*, possibly *elwesi*, and even *nebulosa*—which is obviously going too far even for an astute "lumper" in systematics.

occurs in the collection from Southampton Island. All the specimens from Southampton must be referred not to the true *nastes*, but to a distinct local form coinciding in part with *C. rossi* Guenée. Some of the specimens belong to typical *rossi* with the characteristic faint orange suffusion on the upper side of the wings. The great majority, however, while in all other respects conforming to the original description of *rossi* and to its type, differ in the absence of the orange tint on the upper and under sides, the ground-color being greenish or yellowish white. This is the dominant tint in the specimens from Southampton Island. While a few of the specimens absolutely agree with Guenée's original description, the vast majority are distinguished by the absence of the orange tint.

10. *Colias nastes* Boisd. *gueneei* Avinoff subsp. nov.

Pl. XXVII, figs. 1, 11, 21-22, 25-27, 31-32.

In regard to the nomenclatorial designation of the race of Southampton Island I am not in favor of accepting the name *rossi*, since it was definitely used for an aberrant, possibly hybrid, form characterized by the presence of an orange tinge on the upper side. We cannot amplify the description as worded by the original author and disregard his indication of the unusual tinge in the color of the upper side, consequently the normal type of the race of *nastes* as found in Boothia Felix and apparently identical with the one from Southampton Island, should receive a new name. To name it *gueneei* would be only a mark of accepted nomenclatorial courtesy practiced in cases when it is desired to commemorate the first author of a related form, the name of which cannot be maintained for a wider application. On the basis of the foregoing reason, the form *rossi* should be envisaged as an aberration of the subspecies *gueneei*, or as a hybrid of the latter and of *hecla*. The description would then be as follows: similar to *rossi*, but lacking the orange tint on the upper wings. This character is typical for the normal representatives of *nastes* in both arctic localities mentioned heretofore.

The race *gueneei* has certain affinities with *moina* and *subarctica* and is distinguishable from the first by more developed maculation of the antemarginal maculation of the underside and from the latter not only by this characteristic but also by an absence of a predominant suffusion with dark scales of the basal portion of the underside of the secondaries. Occasional specimens approximating these two races may be nevertheless found among *gueneei* although the general habitus of the race from Southampton Island is quite marked being probably identical, as was mentioned before, with the representative of the species from Boothia Felix deprived of the orange tinge of *rossi*. It is worth stating that the majority of the series secured by Sutton show a tendency toward a greater development of antemarginal maculations on the reverse than the type of *rossi* from Boothia Felix. It may be remarked that in many cases of racial distinctions within the boundary of a definite species it would be reasonable to indicate the prevailing trend of the characteristics which may not be exhibited in every specimen. It is more the physiognomy of the whole series that bears the mark of certain peculiarities than the absolute properties of every individual link in the whole chain of events. With a leaning toward nomenclatorial differentiations one might assign separate subspecific names to the two arctic races, but I prefer not to follow such a course before a more thorough study of the fauna on Boothia Felix is accomplished, and in view of the fact that a certain proportion of the individuals from both localities as known at present are practically indistinguishable.

In the explanatory remarks pertaining to the plates attention will be drawn to the wide

range of variation of these insects from Southampton Island which might easily tempt addicts of a more liberal policy into giving names to incidental forms.

11. *Colias hecla* Lefebvre. Pl. XXVII, figs. 10, 20, 35.

This species is represented in the material assembled by Dr. Sutton in 7 ♂ and 4 ♀. The specimens of the species are relatively uniform and show but little variation in the width of the dark marginal portions in the intensity of the orange coloration and in the dark suffusion on the reverse of the wings which does not show any antemarginal maculation. The form of *sulitelma* found in the arctic region of the Scandinavian peninsula is less divergent from the American typical form than is the corresponding case with the group of *nastes*. Although the grounds of specific divisions will always remain somewhat arbitrary with scarcely any sufficient structural divergence existing among insects attributed to various species, nevertheless within the accepted taxonomic terminology for this genus it is appropriate to ascribe to the European *sulitelma* a merely subspecific position whereas *verdandi* has the right to be envisaged as a species in accordance with preceding statements in this paper.

12. *Colias boothi* Curtis. Pl. XXVI, figs. 12-13a; Pl. XXVII, figs. 6-9, 17-19, 28-29, 34.

Colias boothi is justly considered to be among the rarest species of the genus. With the exception of *Colias imperialis*, the origin of which until now remains an unsolved question, and which has been attributed at various times to the fauna either of Patagonia or the Sandwich Islands, the northern American polar species is represented in but very few collections. It is only in recent times that small series of *boothi* were obtained since the original capture of the typical series described by Curtis in 1834. It seems to be a pity that this insect has to be deprived, in my opinion, of a specific status. I am advancing this idea that has not been suggested by any other entomologist and that has been recorded as my opinion in the last edition of The Butterfly Book on the basis of the material collected by George M. Sutton, confirming the suspicion I entertained heretofore in regard to this butterfly. I am inclined to think that *C. boothi* is a hybrid between *Colias hecla* and the local race of *Colias nastes* designated as *guenei*.

Already the series of *boothi*, published by Verity on Plate LXXI of Rhop. Pal., demonstrates the extraordinary instability of this butterfly. The most variable part of it is the dark exterior border which either shows the configuration of a solid band characteristic of *hecla* or denotes a more or less clear development of the light spots in this band of *nastes*. The extreme form diverging in the latter direction, showing a confluence of this light maculation to the extent of an almost total obliteration of the dark parts, has been designated by the original author as ab. *chione*. It may be interesting to note that the form *chione*, described by Curtis, which is characterized by an absence of the exterior dark border of the wings and which is represented in various transitional forms in the set collected by Mr. Sutton, is referred to by Elwes (p. 140, Trans. Ent. Soc. of London, 1880) as a possible hybrid between *nastes* and *boothi*, although this author does not doubt the specific validity of the latter. In my opinion he was thus half way to the truth. Verity indicates the variability of *boothi* both in the direction of *nastes* and *hecla* with which it is found flying, but does not draw the conclusion of their crossing. There are good reasons to believe that *C. verdandi* ab. *christienssoni* is actually a paralleling hybrid between the European representatives of *nastes* and *hecla* (*sulitelma*). It has been considered as being but an aberrant form with a more or less orange pigmentation of the discus of both wings; but anyone who has seen a considerable

large series of this form will observe the extreme instability of this sport showing sometimes the continuous exterior banding of *hecla*. The theory of the hybrid nature of *boothi* receives a considerable substantiation by occurrences in the genus *Colias* from Central Asia. In the mountains of Pamir and adjacent ranges are found flying together two representatives of the genus *Colias* corresponding to *hecla* and *nastes*—namely, *C. eogene* and *C. cocandica*. A peculiar form of the first was described as ab. *brunneo-viridis*. This considerably rare butterfly shows a mutation of *eogene* in the direction of *cocandica*. The original brick-red color of the first turns in varying degrees into a dull brown reaching an entirely green hue in a form I described as ab. *oshanini*. Once in a while, light antemarginal maculae begin to show as a distinct tendency toward the characters of *cocandica*. At the time I described *oshanini* in 1912 I advanced the hypothesis that such truly intermediate forms in reality originate as actual hybrids, although naturally the crossing was never proved experimentally as the earlier stages of both butterflies are unknown. What seems to be such a plausible case in the mountains of Central Asia could easily have happened in boreal America in connection with *nastes* and *hecla*.

The forms of *nastes* from North America which have been described at various times throw some light on this question. *C. nastes* var. *rossi* shows a certain degree of orange tint on its wings, and there is good reason to believe that it owes this character to a direct inheritance from *hecla* as one of the parents of this mixed brood. The form *rossi* was described from Boothia Felix, namely from the same locality from which *C. boothi* was originally obtained. The study by Verity of the series of *rossi* in the British Museum shows that a considerable variability prevails in this form which I take as a secondary indication of its mixed nature.

Gibson, in describing the entomological results of the Canadian Expedition of 1913-1918, remarks in a rather significant way that some specimens of *hecla* were erroneously attributed to *boothi*. They may have been specimens which belonged to the transitional set of intermediate forms like those which now have become known through the exploration of Sutton. The material brought by Sutton makes it clear that the *nastes* from Southampton Island is not identical with the true *nastes* of Labrador. It is a different insect on account of the presence of a band of antemarginal dark patches transversing the underside of both wings. *Moina* was referred to by Verity as a closer relative to *cocandica* than to *nastes* on the basis of the peculiarities of the reverse of the wings.

Another form of *nastes*, namely *streckeri* Gr. Gr., from the Rocky Mountains, deviates from the typical *nastes* and approaches *moina* on account of the increased size of the central patch of the underside of the hind wings. It has been also assigned to a closer relationship with *cocandica*. All these facts indicate a genuine kinship of the pair of boreal American *Colias* (*hecla* and *nastes*) to their palearctic counterpart in Lapland, also represented by vicarious species in Central Asia. In my correspondence with Verity, sometime about 1910, I expressed my view upon the hybrids of *eogene* and *cocandica*. This opinion of mine is recorded in a quotation from my letter on Page 353 of Rhop. Pal., where the case of a "passage à hybride" is discussed. Throughout this group we may expect with good reasons some phenomena of hybridization. One may also mention that in a synoptic chart prepared by Verity for the genus *Colias*, he places *boothi* between *nastes* and *hecla* although he maintains the specific independence for *boothi*. In the light of the facts available to science at present, the name *boothi* should be relegated to a crossbreed without any true limits of demarcation for this form, since it runs imperceptibly into the parental species. One should mention, however, that the intergradation, of the type known as *boothi* from original descriptions, runs

into a more uniform linkage toward *nastes* than in the direction of *hecla*. It is worth while noting that the same holds true in regard to the connections of intermediate forms between *oegene* and *cocandica*, where one can study all the shades of emergent orange coloration in very faint tints.

There may be an alternative theory in regard to this group of *Colias* stipulating that there are three species and that *boothi* is a specifically independent entity which hybridizes with either of the other two members of the group. Such an interpretation may be supported by the following considerations.

First; in the lot collected by Sutton there are scarcely a dozen *hecla*, whereas the number of the so-called *boothi* runs over thirty. It may seem somewhat doubtful that the hybrid would show such a preponderance over one of the hypothetical parents.

Second; the size of *boothi* is in the average slightly larger than that of *nastes gueneei*, and in several cases, exceeds even the size of *hecla* which is altogether larger than *nastes*.

Third; the underside of *boothi* never shows the development of antemarginal maculation on the hind wings as accentuated as in *nastes gueneei*.

There is no doubt that the material from Southampton demonstrates a most remarkable case of intergradation throughout this whole series, but the question of assigning an independent position to the intermediate form may be ultimately settled only through direct breeding, as has already been mentioned before.

In reference to the possibilities of hybridization within the genus *Colias* in general, instances to this effect were indicated not only by Groum-Grshimailo, as was quoted heretofore, but also by that keen student of palearctic Lepidoptera, the late Serge Alpheraky. He pointed out the significance of the orange tinge in the forms of *erate* called *chrysodona* and *helichta*. He considers that the latter is a true hybrid between *erate* and *edusa* (*croceus*). Although interbreeding was never verified in an experimental manner, it remains very probable for a considerable territory where both species fly together, namely the southern part of Russia. It was interesting, however, to find specimens with a distinct orange tinge among *erate* from Central Asia where no *edusa* were encountered. Thus the hybrid nature of such specimens from these districts is excluded and we have to look upon such specimens as true aberrations. This case should be kept in mind for a fair judgment about supposed hybrids between species of *Colias*, and calls for a certain reserve upon any final statements about the crossing of *nastes gueneei* and *hecla* on Southampton Island, as well as on the systematic position of *C. boothi* and *rossi*.

An explanation for the two plates of *Colias* is needed in order to understand the characteristics of the specimens which are represented and the purpose with which some comparative material from other regions outside of Southampton Island has been introduced. Plate XXVI has as its aim the illustration of type specimens, paratypes, and topotypes of the most important forms of the *nastes* group from the American territory. This plate permits one at a glance to compare the characteristics both of the upper and the undersides of these various races and to evaluate the peculiarities of these forms and relative degrees of validity of their separation under special names. Particular attention is drawn to the various degrees of development of the submarginal band of maculation on the hind wings and the variety in the dark irroration of scales in the discal and basal parts. Another point worth observing on the underside of the hind wings is the central whitish spot frequently doubled with the various forms of brownish red encircling—running in some cases in a characteristic point directed outwardly. The formation of this part of the pattern in the genus *Colias* is often one of the diacritical marks for separation.

The first two vertical rows of forms on Plate XXVII are assembled in such a fashion as to give a picture of the intergradation from the typical *nastes gueneei* toward *hecla* through a series of *boothi*. The vertical column of specimens from Nos. 1 to 10 showing the males is paralleled by the adjacent row from Nos. 11 to 20 representing a similar phenomenon of gradual transitions in the females. With the rich material collected by Sutton these rows of intergrading forms can be amplified into a perfect scale of gradual transitions from step to step. There remains only one break in the males in which although it approaches *hecla*, it still cannot be identified with that species and possesses the characters of *boothi* in the width of the band and the presence of a lemon yellow ground coloration. A reference to the plates of Verity supplements this series in the sense of representing two males of *boothi* which are still closer to *hecla* than the extreme individual in this regard shown under Fig. 9. Such is the specimen of *boothi* shown on Pl. 71, fig. 16, which is very close to a form represented under Fig. 22 as *hecla chrysothemoides* Verity. Bearing in mind this fact, it is apparent that it becomes increasingly difficult to break this row into separate units correlating them with the accepted systematic entities. *C. rossi* gradually emerges in this row from the normal *gueneei* by acquiring an increasing saturation of the orange. Although it would be easy to pick a typical *rossi* such as No. 3, for instance, nevertheless the specimen shown in Fig. 5 has an excessive brightness of color—a more accentuated definiteness of the dark margin of the hind wings, which suggests the characteristic traits of *boothi*. It is remarkable that in such specimens is observed a certain restriction of the antemarginal spots of the hind wings which are practically evanescent in the true *boothi*, and totally absent in *hecla*. In the light of this documentation the theory of hybridization acquires a convincing ground in accordance with the preceding exposition.

The three lower specimens of the third row, from Nos. 28 to 30, represent somewhat aberrant individuals among *boothi*. As compared with Fig. 28 the specimen shown under Fig. 29 is an exceptionally light individual with an almost complete loss of antemarginal pattern of the hind wings. Although the median black spot in the discus of the front wings is quite clear, it constitutes a certain analogy in the female of the aberration which has received the name of *chione* shown under Fig. 30 and corresponding closely to the type of this sport.

The upper part of the third row, from Nos. 21 to 27, portrays some of the most salient variations of *gueneei*. Fig. 21 is the whitest male in the series compared with one of the darkest shown under Fig. 22, which has somewhat the aspect of a form of *cocandica* from Turkestan, whereas the radiating light spots in the exterior part of the front wings, by their shape are reminiscent of those of *C. nebulosa*, *ladakensis*, and *tamerlana*. No. 23 with the somewhat rounder shape of the wings and the typically orange tint of the disc is almost indistinguishable from *christienssoni*, male, shown under Fig. 41, if it were not for the dark antemarginal maculation on the reverse which is absent in *werdandi* and *christienssoni*. If it will be proven that not only *boothi*, but *rossi* as well, is a product of mixed blood, it may be quite probable that *christienssoni* is a similar hybrid produced by the crossing of *werdandi* and *C. hecla sulitelma*. No. 24 is a rather aberrant specimen of *rossi* with an even suffusion of dark scale of the wings and is strikingly analogous to the specimen Fig. 43 representing a rare instance of *cocandica* with an orange tinge which is supposed to be the result of an inter-breeding with *C. eogene*. In fact this Southampton specimen seems to be like a diminutive version of its Asiatic counterpart. The specimens Nos. 25, 26, 27 show three extreme phases among females of true *gueneei*, No. 25 being extraordinarily white and deficient of pattern; No. 26 represents the utmost accentuation of dark marginal pattern with a greyish suffusion over the wing not unlike specimens of *cocandica*. No. 27 is remarkable on account

of an exceptional intensity of a bright lemon yellow tint and a clearly defined dark marginal portion with a row of large yellow spots. Some lepidopterists would be inclined to affix aberrational names for such specimens. In fact it would be easy to give any number of names to various individual specimens of the set brought back by Sutton, if any one would wish to indulge in burdening the entomological nomenclature as has been done so often in later times and with so little ground. The extreme specimens are indeed quite striking, but the intergradations demonstrate only the range of variability interconnected by gradual links. It might be mentioned that such a bright yellow example as the one in Fig. 27 has counterparts among the females of *C. cocandica*. Similar color phases occur rather frequently among *C. cocandica* from Tian-Shan, and in much rarer cases from Pamir. The undersides of specimens in the upper portion of the fourth row seem to be especially instructive, the first two, Nos. 31 and 32, show the range of variation in the development of the antemarginal black maculation in *gueneei*. Fig. 32 shows an extreme form as far as the development of the antemarginal maculation and the width of the brownish central marking of the hind wing are concerned. Such an aspect of the underside is typical for *gueneei* and is not found in local races of *nastes* on the American continent. It goes even further than the characteristics of the underside of *cocandica* which often displays a heavy antemarginal maculation, showing however as a rule a restricted reddish-brown area around the central spot. It is only *C. elvessi* which shows such a marked antemarginal maculation followed by a light external border, whereas the central spot has a still less conspicuous dark surrounding. If all the specimens from Southampton Island were to show such a characteristic development of the pattern on the underside this form would be always easily recognized and would never be mixed with its relatives of the mainland. Yet the phenomenon is more complicated, and it was considered advisable to show the most extreme forms in the opposite direction—namely, the underside of Fig. 36 which is comparable with the reverse of *subarctica* as shown under Figs. 6a and 7a of Plate XXVI. Fig. 31 has an exceptional restriction of the antemarginal pattern for a specimen from Southampton and could scarcely be distinguished from *moina* as the comparison with Figs. 14a and 15a on Plate XXVI clearly demonstrates. In the point of fact it is the predominance of strongly marked characteristics of the underside of the specimens from Southampton which do not permit one to identify them completely with *moina* and *subarctica*. Fig. 34 showing the reverse of *boothi* illustrates a restriction of the antemarginal maculations standing in this regard midway between *gueneei* and *rossi* on one side and *hecla* on the other, the latter being shown under Fig. 35. By observing the variance of the underside from Figs. 31 to 35 one can gather a clear visual conception of these intergradations from one extreme to another.

Fig. 36 represents *C. nastes* from Port Harrison, Hudson Bay, being still more extreme than the type from the point of view of the loss of the light maculation in the dark exterior band of the primaries. This dark exterior margin tends to form a solid band of the type characterizing the *hecla* group and should be compared with the remarkable aberrant specimen of *verdandi immaculata* Lampa which could be taken for a *sulitelma* without orange. Figs. 38 and 39 demonstrate the variation in the shape of two wings of *verdandi* which may be broad or more pointed, the latter characteristic being more typical for the American representatives of the group. Fig. 40 is a female of *melinos* which compares on the upperside rather closely with such representatives of the Southampton race as the one in Fig. 29 from which it differs decidedly on account of the uniformity of the reverse. Figs. 43 to 47 show certain forms of *cocandica* among which Nos. 44 and 47 closely approximate certain specimens from Southampton. Altogether the insects shown in the Figs. 37 to 49 are introduced

for the purpose of comparison of Arctic American Coliads with related species from the Old World.

A summary of the affinities within the group of *Colias* relating to *nastes* in a wide sense could be approached as follows, with an occasional repetition of some of the statements made in the preceding pages.

In a certain sense the whole group of *Colias nastes* and allied species is a homogeneous division within the genus *Colias*. To this section, besides *nastes*, belong *C. cocandica*, *melinos*, *eluesi*, *sifanica*, *nebulosa*, *phicomone*, *ladakensis*, and *montium*. The closest affinity within this group exists between *nastes* and *cocandica* through certain racial forms of these two species. The races of *cocandica* which have received the name of *maja* show a definite resemblance with the darker individuals of the American species. On the other hand the northern European subspecies of *nastes* bearing the name of *werdandi* is approaching considerably the Siberian *melinos*, especially the race *herzi* of the latter. Owing to the existence of such forms which could be construed as transitional connecting links one might look upon *melinos* as the Siberian representative of *nastes* and ascribe to it a conspecific position with the boreal species found in the Old and New World.

The two isolated species, *phicomone* in the Alps of Europe, and *montium* in eastern Tibet, denote a certain kinship with *melinos*, especially with its form *deckerti*. The area of distribution of these three species is discontinuous which accounts unquestionably for this specific hiatus dividing these three butterflies into independent systematic entities.

There exists a rather remarkable similarity between the race of *nastes* with a highly developed pattern of the underside of the hind wings, characteristic for Southampton Island, and *C. eluesi* of western Tibet. If it were not for the yellowish color of the fringes the female of the Tibetan *eluesi* would easily pass for a female of *nastes* from Southampton Island.

A type of *C. ladakensis* is on the whole more divergent from the characters of *nastes*, together with *nina* from southern Tibet, which has scarcely the right to be considered an independent species unless certain facts of simultaneous distribution in the district of Mt. Everest will be confirmed. Both occupy an eccentric position in the cycle of the *nastes* group in a broader sense. A striking peculiarity of *nina* is the fact that the females are more brightly colored than the males, tending toward the orange in *ladakensis* and toward the red of *berylla*. No white dimorphic females of these species have been ever found, whereas the females of all the rest of the species of the *nastes* group normally have whitish females.

This brief synoptic survey does not include *C. alpherakyi* from Bokara, Pamir, and Chitral, although the exterior aspect of the male is not unlike the darker representatives of the American *nastes*. The invariable pale yellow fringes of these species and the character of the underside of the hind wings indicate clearly their far more remote connection with the group in question than the outer facies might show. *C. sieversi* is still more divergent leading to the most paradoxical member of the Coliads, still preserving some vestiges of relationship with the *nastes* type, namely *C. christophi*, noted for its unusual russet color of the discus of the wings and the pure white antemarginal bands on both wings with almost white fringes.

Another point worth observing in connection with the systematic relationship of *nastes* and *cocandica* is connected with cases of alleged hybridization. It should be borne in mind that no positive biological proof in this regard has ever been obtained and no experimental testimony is available. Groum-Grshimailo, in the fourth volume of "Mem. sur Lep.," dis-

cusses at length the variations of coloration and pattern in *cocandica* and *eogene* which cannot be construed otherwise than as instances of hybridizing. The most extreme form of *eogene* possessing the coloration of a true *cocandica* has been later named by me as *oshanini*. Similar brown forms have been called *hybrida*, aptly indicative of the nature of such variations. Furthermore rather numerous *cocandica* have been secured with a brownish admixture to the green tint of the normal form. In my collection there were about fifteen transitional individuals between these two species from the Trans-Alai Mountains where both *cocandica* and *eogene* were plentiful and flying constantly together.

The orange form of *werdandi christiensi* from Lapland was described as an aberration, but it may be easily surmised that such specimens are the result of crossing between the aforesaid races of *nastes* and *hecla sulitelma*. It may be worth mentioning that the vicarious species of *hecla* found in Siberia and called *viliuensis*, flies together with *melinos*, and has never been known to produce any hybrids. It would be important to collect more material in this region since such a hybridization should be entirely probable. In view of these facts there is good reason to believe that the *hecla* and *nastes* of Southampton Island produce hybrids; *C. boothi* may be dismissed as an independent specific unit until more positive evidence will be collected and may be provisionally classed as a product of interbreeding between the two representatives of *Colias* on the Island.

The parallelism of two types of *Colias*, one orange, the other greenish, allied by a considerable similarity of the underside is exemplified in the Old World by the pairs of *werdandi*—*sulitelma* in Lapland, *cocandica*—*eogene* in Turkestan, *elucesi*—*stoliczkan*a in Ladakh, and in the New World by *nastes*—*hecla*, this phenomenon has its counterpart in the alpine regions of South America where such a relationship is expressed by *dimer*a—*mossi* found together in high altitudes of Peru and Bolivia. It is one of the puzzling and striking facts in the distribution of the genus *Colias* that two kinds of butterflies of that genus, exteriorly so unlike so far as the upperside is concerned, and on good grounds assigned to different sections of the genus, seem to have a similar destiny in their distribution over the globe. Some features of this problem have been already indicated by Groum-Grshimailo in 1884, although the facts concerning Ladakh and South America were not known to him. If we postulate the development of the orange and green Coliads from a single source, without complicating the question by a polyphyletic hypothesis, we are confronted with a phenomenon described sometimes as convergence, although such an issue invalidates to a considerable extent the whole scheme of a successive evolutionary descent. It seems to be more plausible to surmise that the two kinds of *Colias* so singularly similar are connected with certain ecological conditions favoring the simultaneous breeding of the types and causing their joint distribution, as well as their joint survival, in cases when a broader dispersion was restricted in the course of geological history to a more limited area. From this angle it would be of interest to observe to what extent the similarity of the pattern of the underside is preserved in the representatives of these two subdivisions of *Colias* found in the same region. In the first place we are driven to the conclusion that the prototype of these two groups as well as of the whole genus *Colias* had an antemarginal band of maculation on the hind wings corresponding to such intraneural markings found in a large variety of Pierids. It is an ancestral character peculiar to the whole family which may tend in certain cases to disappear. It would be difficult to postulate a re-emergence of a lost character as this negative rule seems to hold throughout the evolutionary history of living forms. It is reasonable to admit that the race of *nastes* found on Southampton Island is about the most primitive of the whole section of the green Coliads. It is also remarkable that the South American *mossi*

and *blameyi* have also maintained this archaic trait. Available facts favor the hypothesis of assigning the New World as the original home of the *nastes* cycle at variance with the theory of Groum who advocates the joint origination of the orange and green Coliads in Central Asia. In comparing the undersides of the two kinds of *Colias* from the same localities we observe that the antemarginal spots in the orange group are present in *stoliczkana* from Ladakh, *arida* from Chinese Turkestan, *miranda* from Sikkim—all three belonging in my opinion to one species and not conspecific with *eogene*, as is accepted by the majority of lepidopterists. One of the best proofs of the specific independence of the two latter Coliads is the fact of the simultaneous co-existence, side by side, of *eogene* and *stoliczkana* in the north of Kashmir, the only known territory where the areas of distribution of the two forms are overlapping. In continuing our enumeration of the spotted orange Coliads one should also mention *dimera* of South America. On the other hand the antemarginal maculations are present in the green group only in *cocandica* with its numerous forms and in the race of *nastes* from Southampton Island, as well as to a certain extent in a race of *nastes* from the Rocky Mountains. The very fact that such spots are observable on some continuant races of *nastes* in a less marked degree than the form from Boothia Felix and Southampton Island, excludes the possibility of envisaging it as an independent species, and warrants a sub-specific affiliation with *nastes*. There are some more divergent species of the yellow and green group kindred to *nastes* which also have the intraneural dark spots on the hind wings like *nebulosa*, the recently described *richthofeni* (thought to be related to *cocandica*, but in my opinion closer to *nebulosa*), *ladakensis*, and *nina*, but this case is immaterial in this conjunction on account of the relatively more remote systematic position of those species. The fact of importance, however, is that on Southampton Island the orange representative, namely, the typical *hecla*, has an even underside of the hind wings, whereas the vicarious form of *nastes*, the subspecies *gueneei*, shows the maximum development of the primitive markings. One can summarize this relationship in the following diagram:

	Presence of spots on the reverse in	
	<i>hecla</i> group Orange	<i>nastes</i> group Greenish Yellow
Southampton Island.....	—	+
Labrador.....	—	—
Alaska.....	—	—
South America.....	+	+
Lapland.....	—	—
Siberia.....	—	—
Turkestan.....	—	+
Ladakh.....	+	+
Tibet.....	+	+

References to original sources.

For purposes of clarity and convenience, it seems advisable, in references to the basic sources, to give a transcript of the original descriptions of some of the forms of *Colias* in question, namely, *nastes*, *hecla*, *boothi*, *chiome*, *rossi*, and *cocandica*.

The article by Guenée appearing under the title "*Note sur quelques espèces du genre Colias*," was presented at the meeting of the Entomological Society of France, February 10, 1864, Ann. Soc. Entom. de France, 1864, 4 ser., 4, p. 197-200, a verbatim translation of which is as follows:

"Today I shall call the attention of the Society principally to two diurnals belonging to the genus *Colias*, concerning which much has already been said without as yet the ability to set forth the facts in a clear light. The bounty of Mr. Curtis and the friendship of Mr.

Doubleday have given me the opportunity to study the very rare specimens which have come to Europe. We are dealing with *Colias Hecla* and *Boothii*, which have been by modern entomologists either admitted, or denied, to be identical.

"The first was published, as is well known, in our Annals by my old friend, M. Alexandre Lefebvre as early as 1836, his description being founded upon some specimens which he had received from Greenland. But the insect for a long time was so rare that neither Duponchel in his Supplement, nor M. Boisduval in his *Icones* mentioned them, only in their Catalogs speaking of them as synonymous with *Boothii* (of which they had made no previous mention), presuming, I do not know upon what data, that M. Lefebvre had confounded the two although he positively states the contrary, first in the *Annales*, p. 383, and then in the *Errata* at the end of the volume.

"With the exception of Zetterstedt, who presented this species under the name of *Hecla* in his *Insecta Lapponica*, while rectifying its habitat, everyone confidently accepted the decision of MM. Boisduval and Duponchel, and of M. Herrich-Schaeffer, who in his great work figured the male of *Boothii*, giving as a synonym *Hecla* Lefebvre, without further verification.

"Finally M. Staudinger, in the Catalog which he has recently published, follows his predecessors, and his opinion is the more conducive to error, because he had himself collected *Colias hecla* in abundance during his journeys in the north of Europe.

"True *Boothii*, brought from the pole by Captain J. Ross, was published by Mr. Curtis a little before the article by M. Lefebvre, as well as a second *Colias* of the same region which he [Curtis] named *Chione*. This *Boothii*, of which only a few examples have reached Europe, has been and still is, much rarer than *Hecla*, especially the females, of which only two have been found.

"Now then, not only are *Colias Hecla* and *Boothii* two distinct species, but they are widely separated: *Hecla*, as aptly observed by M. Lefebvre, having a certain affinity to *Myrmidone*, while *Boothii* closely approaches *Nastes*. Here follows an account of their characteristics and their synonymy.

Colias Hecla Lef.

"Lefebvre, Ann. Soc. Ent., 1836, pl. 9, figs. 3-6.—Zetterst. Ins. Lap. p. 908.—*Boothii* Herr.-Sch., I, p. 103 and VI, p. 23. fig. 459, 460 (var. ♀?)—Staud., Catal., p. 3, No. 56.

"It has nearly the size of *Chrysotheme* and the color of *Myrmidone*, but in outline is different, the primaries being less triangular, more prolonged at the apex, with the outer border not nearly so straight. The marginal band is very sharply defined, with slight indentations on its inner margin, and interrupted by some yellow nervules at the apex, but is decidedly less expanded in this region than in the case of the two species cited above. The cellular spot is narrow, irregular, and the fringes are ordinarily quite feebly tinted with rose.

"On the under side this *Colias* does not resemble those which I have just cited. The primaries are pale orange powdered with some black atoms, the marginal band appearing green through transparency. The cellular spot is pupilled with white. So far as the series of blackish spots is concerned, it is often wanting and only the outermost can be perceived. The secondaries are wholly and strongly powdered with green, so that no orange is seen except near the marginal band. The cellular spot is small, rounded, rose-colored, and encircled by brick-red. The costal spot is blackish and scarcely visible.

"It inhabits Greenland, the North Cape, and northern Lapland.

Colias Boothii Curt.

"Curt., Voy. du cap. Ross.—Herr.-Sch., fig. 39, 40.

"It has the size of *Pelidne* and very much the same cut of wings. The ground-color is also somewhat the same, that is to say *greenish sulphur*, except that the primaries are lightly tinted with orange upon the disk, between the second inferior nervule and the internal margin. The marginal border is very narrow, on the inner margin indistinctly and poorly defined, very pale blackish, or it might be said greatly deadened in tint by yellow atoms; no yellow nervules at the apex; a greatly reduced cellular streak. The secondaries show no admixture of orange, except the cellular spot, and they are broadly powdered with black on the abdominal margin. The marginal border is still narrower and more poorly defined than on the primaries.

"The under side recalls that of *Nastes*, but it is throughout greenish sulphur. The fore wings have a little yellow pupil on the internal portion of the cellular spot, and a series of blackish spots parallel to the outer margins decreasing in size from the inner to the upper margin. The hind wings are wholly yellow olivaceous, with an oblong and pointed cellular spot, which is brick-red, marked anteriorly by a silvery point. Their marginal border far from being distinguished by its depth of color as in the case of *Hecla*, is on the contrary lighter, or less dusky than the body of the wing and parted from the disk by an accumulation of atoms, which in the case of some specimens go so far as to form spots of orange. There is no streak on the four wings. Internally the club of the antennæ is greenish yellow. The fringes are conspicuously and entirely pink on both sides.

"The female differs from the male by having the cellular spot larger on all four wings, the marginal border wider and interrupted on the four wings by a series of sulphur spots almost touching each other; but those on the secondaries tend to disappear before the anal angle. The orange tint is a little more pronounced. The under side is darker and greener than in the case of the male, and more closely approaches that of *Nastes*. In the case of my specimen the cellular spot is bipupilled with silvery.

"It has been found in the polar regions by Captain Ross.

Var. *Colias Chione* Curtis.

"This is a male entirely without the blackish marginal border and the cellular spot on the primaries. This spot appears on the under side in the form of a very thin blackish ring. This is evidently only a form aberrant from the type. However, it is curious as showing an increasing departure from the type of *Hecla*.

Colias Rossii Gn.

"An Var. *Nastes*?

"I received from Mr. Doubleday, together with the rare *Colias*, which I have just described, three individuals of another species of the same genus likewise taken on the expedition of Captain Ross, and which may perhaps only represent a local variety of *Nastes*, but which nevertheless display notable differences.

"It is of the size of *Nastes*, but the wings are perhaps a little more rounded. The male is distinguished on the upper side by the very light orange tint on the part corresponding to colored in *Boothii*. The nervules at this point are better defined being black upon a ground much less sanded with atoms than in the case of *Nastes*. Furthermore the internal border is plainly more convex than in the case of *Nastes* ♂,* thus causing the wing to appear broader;

*This is not a constant character. A. A.

the marginal border is wider than that of *Nastes* and interrupted by a series of seven sulphury or greenish spots, as sharply defined internally as exteriorly, and extending to the costa.

"The female is greenish white, but always a little more tinted with yellow than in the case of *Nastes*.

"The under side of the wings in both sexes is greenish white, more tinged with yellow, in the case of the male. On the fore wings the series of subterminal blackish spots is complete and well defined. On the hind wings this series is continued and so bounds the very dark part of the disk, marking off a sharp clear-cut border, which appears toothed or internally sinuate, because the spots are not all on the same line. The brick-red cellular spot has a large white pupil also sharply defined.

"I repeat that this *Colias* has a facies distinct from *Nastes*, especially that from Labrador, and if the differences which I have pointed out, should be reproduced in other specimens, I should not hesitate to believe it to be a valid species. It is still more remote from *Melinis*.

"I have given to this *Colias* the name of the celebrated explorer, who brought it from the Pole with *Boothii*."

Original description of *C. hecla* Lefebvre given in the Ann. Soc. Ent. France, Vol. V, 1836, pp. 384-387. (Translation)

Colias Hecla, Lefeb.

"Alis supra fulvo luteis, limbo communi nigrescente; subtus virescentibus, anticis puncto ocellari nigro, posticis puncto unico albo. Fæminæ limbo supra maculis sulphureis signato."

(Expanse: 19—20 lines)

MALE

(Figs. 3 and 4).

"The upper side of the fore wings is reddish yellow, which becomes brighter and changes to silvery yellow along the costa of the upper wings as well as upon the anterior and abdominal border of the secondaries. Each wing is bounded by a black marginal border powdered with yellow and finely intersected by this color along the nervules. Furthermore on the disk of the primaries there is a small black crescent and upon the disk of the secondaries a small orbicular spot of orange-red. Finally the four wings at their bases are powdered with black, with yellow hairs, and the fringe, the base of which is sulphur-yellow, is washed with rose from the summit to the sixth nervule on the upper wings, and from the fifth nervule to the anal angle upon the lower wings.

"The under side of the fore wings is sulphur-yellow finely powdered with black, resulting in a greenish appearance, with the exception of the base of the upper wings which is pure yellow. These same wings have the costa bordered with rose, and their disk marked by a little black point pupilled with white, while upon the secondaries may be seen a small, irregular, ferruginous spot, surmounted with a yellowish white point. Furthermore along the terminal borders of the fore wings there appears a series of clear yellow spots which scarcely differ from the ground-color. Finally the fringes are half yellow and half rose as on the upper side.

"The antennæ are ferruginous red with the club brown, at the tip yellow above and ferruginous below.

"The hairs which mount the head and those of the collar are violet-rose. The remainder of the corselet and abdomen are black adorned with long whitish or yellowish hairs. The palpi and the lower side of the body are greenish yellow as well as the thighs. The legs and the tarsi are rose.

FEMALE.

(Figs. 5 and 6).

"The upper side of the primaries is reddish yellow powdered with black only along the costa and at the base, with the nervules black; the upper side of the secondaries is likewise reddish yellow, but powdered all over with black with the exception of the abdominal border which is sulphur-yellow. The four wings are terminated by a blackish marginal band marked with several spots of sulphur-yellow, to the number of seven upon the primaries and four upon the secondaries. There is besides upon the disk of the primaries a large black spot pupilled with yellow and on the secondaries a large irregular spot of vivid orange.

"The under side of the primaries is bright yellow, with the costa and the base greenish, or sulphur-yellow, powdered with black, and with a broad terminal band of the same color upon which may with difficulty be detected the same spots which appear on the upper side, of which the last is accompanied by a black point. The nervules are black and the disk is also marked as above with a black point, pupilled with yellow.

"The under side of the secondaries is entirely greenish or sulphur-yellow powdered with black, with a ferruginous discoidal spot, of which the upper part is occupied by a large white opaque spot followed by another which is smaller and scarcely visible.

"The fringe of the fore wings is entirely rose as on the upper side.

"The antennæ, the head, the palpi, the body, and the feet are as in the male.

"Of all the *Coliads* of the same group to which this species belongs *Chrysotheme* is that which most closely approaches it, or rather which is least remote from it, for there exist between the two many differences which it would be tedious to mention here, and which furthermore are far easier to represent by the brush than in words. We confine ourselves to indicating the principal differences, which are as follows:

1. The under side of the fore wings is much greener than in *Chrysotheme*.
2. Below, parallel to the terminal border in the case of *Chrysotheme*, there is a series of black points, which are lacking in *Hecla*.
3. The discoidal spot of the secondaries of the female above is very large in *Hecla* and has an irregular form, while in *Chrysotheme* it is composed of two twinned ocellate spots, of which one is much smaller than the other.
4. Finally, the same spot below is bordered by a single point of opaque white set off by ferruginous in the case of *Hecla*, while in the case of *Chrysotheme* this spot consists of two silvery points, twinned as on the upper side.

This remarkable and well characterized species inhabits Iceland.

"NOTE: We had just sent this description to the printer, when M. Guérin handed to us a Memoir by Mr. Curtis of London, accompanied by a colored plate upon several new insects collected by the expedition under Captain Ross to the North Pole. Among them there are two *Coliads* of which one under the name of *Boothii* corresponds rather closely with the species here discussed; but upon comparing them attentively it may be observed that the differences which separate them are not less numerous than those which distinguished *Hecla* from *Chrysotheme*. So we think that a synonym has not been created."

The description of *cocandica* appeared in a Russian publication, the translation of which reads as follows: Excerpt from p. 6, Lepidoptera.

"Travel in Turkestan" by Fedchenko, Vol. II, Zoographical Research, Pt. V, Lepidoptera, by N. Erschoff:

No. 13. *Colias Nastes* B.

"Icon. Historiq. des Lépidoptères, Tab. 8, fig. 4, 5; Herrich-Schäffer, Syst. Bearb., fig. 37, 38, 401, 402.

Var. *cocandica* nov. Ersch.

"The only specimen of a female secured by that expedition in the Chanate of Kokan, the figure of which is shown as mentioned above on Pl. I, fig. 3, is to such an extent like the typical *Colias nastes* B. from Labrador, that I hesitated for a long time whether it should be finally ascribed to a special variety. Nevertheless the immense distance lying between Kokan and Labrador, where *nastes* is not found, as well as certain although minute, but nevertheless sufficiently diacritical traits, have led me to recognize in this solitary specimen a new variety which I name *cocandica*. I shall not describe at length this specimen since it would be only a repetition of a description of *nastes*, but I will mention those slight characters which distinguish this individual from the ten specimens of *nastes* from Labrador, preserved in my collection.

"The upper side is darker than *nastes*; the shape of the wings is different, mainly more elongated. The marking in the middle cell near the transverse vein on the upper wings is the shape of a triangle pointing toward the exterior part of the wing. From below, the color of the wings is not yellowish green, but bluish green. The male is unknown; its discovery should demonstrate more clearly whether this is an individual species or is merely a variety.

"Caught June 24th on the mountainous slope near the glacier of Shtchourovsky.

"It may easily happen that this specimen belongs to *Colias eogene* Feld, a species of which at the present time only the males are known, and which has also been recorded by the expedition in the Chanate of Kokan"

HETEROCERA.

BY CARL HEINRICH.

The specimens of moths collected by George Sutton on Southampton Island have been submitted for identification to the distinguished authority on American Heterocera, Mr. Carl Heinrich of the U. S. National Museum in Washington, who consented most kindly to pass judgment on this material. His identifications and descriptions of forms new to science are included in this review of the scientific results obtained by Dr. Sutton in the course of his explorations. The most sincere gratitude is herewith extended to Mr. Heinrich for his obliging courtesy and the willingness with which he undertook the task. A. AVINOFF.

Family NOCTUIDÆ.

SUBFAMILY AGROTINÆ.

Genus AGROTIPHILA Grote.

1. *Agrotiphila quieta* (Hübner) Pl. XXVIII, figs. 28-29.

Noctua quieta Hübner Schmett., Ent. Noct., 485.

Four males and four females, Southampton Island, July 18, 20, 22, 28, and August 5.

SUBFAMILY HADENINÆ.

Genus ANARTA Hübner.

2. *Anarta richardsoni* (Curtis) Pl. XXVIII, figs. 26-27.

Two females, Southampton Island, July 22 and August 1, 1930. The July specimen (fig. 26, plate XXVIII) is typical except that the terminal area of the fore wing is darker on both upper and under sides than in other specimens before me.

The August specimen (fig. 27, plate XXVIII) appears superficially quite different from normal *richardsoni* or any of its named varieties. The fore wing is suffused with black sealing obscuring all transverse markings to beyond the middle and leaving the obicular and reniform very faintly indicated. The subterminal dark spots are fused into a rather broad, black, transverse band, repeated on the under side of the wing as two fine, parallel black lines. The hind wing has a complete, strongly marked, blackish-fuscous post-medial line within and separated from the broad dark terminal border. This dark line is strongly repeated upon the under side of the wing.

I am convinced that this specimen is only an individual aberration and unworthy of a varietal name. It may be what Walker had from Repulse Bay and called *septentrionis* but that cannot be determined from his vague description.

There are no significant differences in genitalia between the above two specimens nor between them and typical females of *richardsoni*.

Family GEOMETRIDÆ.

SUBFAMILY GEOMETRINÆ.

Genus ASPILATES Treitschke.

3. *Aspilates orciferaria labradoriata* (Möschler) Pl. XXVIII, fig. 31.

Two males, Southampton Island, July 8, 27, 1930.

Family PYRALIDÆ.

SUBFAMILY PHYCITINÆ.

Genus POLOPEUSTIS Ragonot.

4. *Polopeustis annulatella* (Zetterstedt) Pl. XXVIII, fig. 34.

Six specimens from Southampton Island.

SUBFAMILY CRAMBINÆ.

Genus CRAMBUS Fabricius.

5. *Crambus trichostomus* (Christoph) Pl. XXVIII, fig. 35.

Six specimens from Southampton Island.

Family PTEROPHORIDÆ.

Genus PLATYPTILIA Hübner.

6. *Platyptilia petrodactyla* (Walker) Pl. XXVIII, fig. 40.

One female from Southampton Island, July 27, 1930.

Genus OIDÆMATOPHORUS Wallengren.

7. *Oidæmatophorus* sp.

One female from Southampton Island, July 28, 1930, in poor condition. Is near *brucei* Fernald and may possibly be a variety of that species.

Genus STENOPTILIA Hübner.

8. *Stenoptilia mengeli* Fernald.

One male from Southampton Island, July 28, 1930.

Family OLETHREUTIDÆ.

SUBFAMILY OLETHREUTINÆ.

Genus APHANIA Hübner.

9. *Aphania frigidana* (Packard) Pl. XXVIII, fig. 32.

One male, Southampton Island, July 28, 1930.

Genus *OLETHREUTES* Hübner.10. *Olethreutes inquietana* (Walker) Pl. XXVIII, fig. 30.

Four males, July 4 and 18, and August 1; four females, July 4, 28, August 1 and 5, Southampton Island. Variable as to size and pattern.

11. *Olethreutes mengelana* (Fernald) Pl. XXVIII, fig. 33.

Two males and one female, Southampton Island, July 5 and August 5, 1930.

SUBFAMILY EUCOSMINÆ.

Genus *THIODIA* Hübner.12. *Thiodia southamptonensis* Heinrich, sp. nov. Pl. XXVIII, fig. 38,
type, 36 and 37 paratypes.

A bluish white species with strongly contrasted black markings. Palpus, face, head, and thorax, blackish fuscous with the ends of the scales white, the palpus paler and more heavily sprinkled with white. Fore wing with an incompleated dark basal patch indicated by a dark shade at extreme base and an outwardly slanting black bar beyond, extending from dorsum to top of cell; from middle of costa a slanting, somewhat irregular, transverse, black band extends to dorsum just before tornus; from middle of this dark band there is a somewhat paler (fuscous) band which forms a half circle over the ocelloid patch and reaches almost to tornal angle, on its upper edge it touches two black spots, which extend from outer third of costa; another similar black spot at apex; ocelloid patch of the bluish white ground-color with a very faint dusting of black in center; cilia pale fuscous; termen straight and slanting; veins 3, 4 and 5 separate at termen and nearly parallel. Hind wings pale gray, glossy; cilia paler, grayish white; veins 3 and 4 united.



southamptonensis

Male genitalia of type

Expanse: 18 mm.

Type: In Carnegie Museum.

Type-locality: Southampton Island.

Described from male type and two male paratypes all from the type locality (collected July 12, July 22, and August 1). The type is in good condition; but the two paratypes are badly rubbed and have the markings almost obliterated. The genitalia of all three are identical. It is a striking species, not to be confused with anything else. In pattern it is closest to McDunnough's *convergana* from Aweme, Manitoba.

Genus *GYPSONOMA* Meyrick13. *Gypsonoma parryana* (Curtis) Pl. XXVIII, fig. 39.

Two males, Southampton Island, July 12, and August 5, 1930.

EXPLANATION OF PLATE XXVI.

All specimens figured are in the collection of the United States National Museum except Figures 14-15 which are the property of the Field Museum of Natural History.

- FIG. 1. *Colias nastes* Boisd., ♂, "type"; from Oberthür Collection (ex Coll. Boisdual).
 FIG. 1a. " " " " " " under side.
 FIG. 2. *Colias nastes streckeri* Gr.-Gr., ♂, topotype, (compared by F. H. Benjamin with "type" in Strecker Collection, Field Museum).
 FIG. 2a. *Colias nastes streckeri* Gr.-Gr., ♂, topotype, under side.
 FIG. 3. *Colias nastes streckeri* Gr.-Gr., ♀, topotype.
 FIG. 3a. " " " " " " " " under side.
 FIG. 4. *Colias nastes* Strecker ab. *obscurata* Verity, ♀; Wilcox Pass.
 FIG. 4a. " " " " " " " " under side.
 FIG. 5. *Colias nastes* Strecker ab. *obscurata* Verity, ♀, Laggan, Alta.
 FIG. 5a. " " " " " " " " under side.
 FIG. 6. *Colias nastes subarctica* McD., ♂, paratype.
 FIG. 6a. " " " " " " " " under side.
 FIG. 7. *Colias nastes subarctica* McD., ♀, paratype.
 FIG. 7a. " " " " " " " " under side.
 FIG. 8. *Colias nastes rossi* Guenée, ♂, type; from Oberthür Collection (ex Coll. Guenée); (identical specimen figured by Verity, Pl. XLIX, fig. 25).
 FIG. 8a. *Colias nastes rossi* Guenée, ♂, type; under side.
 FIG. 9. *Colias nastes rossi* Guenée, ♂, (also ex Coll. Guenée).
 FIG. 10. *Colias nastes rossi* Guenée, ♀, type, (ex Coll. Guenée; figured by Verity, Pl. XLIX, fig. 28).
 FIG. 10a. *Colias nastes rossi* Guenée, ♀, type, under side.
 FIG. 11. *Colias boothi* Curtis ab. *chione* Curtis, ♂, type; from Oberthür Collection (ex Colls. Curtis-Doubleday-Guenée).
 FIG. 11a. *Colias boothi* Curtis ab. *chione* Curtis, ♂, type, under side.
 FIG. 12. *Colias boothi* Curtis, ♂, can probably be considered a type, from Oberthür Collection.
 FIG. 12a. " " " " " " " " " " " " under side.
 FIG. 13. *Colias boothi* Curtis, ♀, can probably be considered a type, from Oberthür Collection.
 FIG. 13a. " " " " " " " " " " " " under side.
 FIG. 14. *Colias nastes moina* Strecker, ♂, type; from Strecker Collection, Field Museum.
 FIG. 14a. " " " " " " " " " " " " under side.
 FIG. 15. *Colias nastes moina* Strecker, ♀, type; from Strecker Collection, Field Museum.
 FIG. 15a. " " " " " " " " " " " " under side.



EXPLANATION OF PLATE XXVII.

All specimens from Southampton Island except when otherwise indicated.

- FIG. 1. *Colias nastes* Boisd., *gueneei* Av., ♂, type.
 FIG. 2. *Colias nastes*, transitional to *rossi* Guenée, ♂.
 FIGS. 3-5. *Colias nastes rossi* Guenée, ♂.
 FIGS. 6-9. *Colias boothi* Curtis, ♂.
 FIG. 10. *Colias hecla* Lef., ♂.
 FIG. 11. *Colias nastes gueneei* Av., ♀, paratype.
 FIGS. 12-16. *Colias nastes rossi*, ♀.
 FIGS. 17-19. *Colias boothi*, ♀.
 FIG. 20. *Colias hecla*, ♀.
 FIG. 21. *Colias nastes gueneei*, ♂, light form.
 FIG. 22. " " " " suffused form.
 FIG. 23. *Colias nastes rossi*, ♂, transitional to *boothi*.
 FIG. 24. " " " " suffused form.
 FIG. 25. *Colias nastes gueneei*, ♀, light form.
 FIG. 26. " " " " dark form.
 FIG. 27. " " " " yellow form.
 FIG. 28. *Colias boothi*, ♀, transitional to *rossi*.
 FIG. 29. " " " extremely light.
 FIG. 30. " " ab. *chione* Curtis, ♂.
 FIG. 31. *Colias nastes gueneei*, ♂, under side extremely light, approaching *moina* Strecker.
 FIG. 32. " " " " under side extremely dark.
 FIG. 33. *Colias nastes rossi*, ♀, under side.
 FIG. 34. *Colias boothi*, ♂, under side.
 FIG. 35. *Colias hecla* Lef., ♂, under side.
 FIG. 36. *Colias nastes* Boisd., ♂, Port Harrison, Labrador.
 FIG. 37. *Colias verdandi* Zett., *immaculata* Lampa, ♂; Arctic Europe.
 FIG. 38. " " " ♂, Nyland Hangö, Finland.
 FIG. 39. " " " ♂, Nyland Hangö, Finland.
 FIG. 40. *Colias melinos* Ev., ♀; Sajan, Siberia.
 FIG. 41. *Colias verdandi christianssoni* Lampa, ♂; Nyland, Finland.
 FIG. 42. " " " " ♀; Nyland, Finland.
 FIG. 43. *Colias cocandica* Ersch., ♂, form *hybrida* Gr.-Gr.; Karakoram Mountains, Shahidulla, India.
 FIG. 44. " " " ♂; Aksu, Chinese Turkestan.
 FIG. 45. " " " ♀; Trans-Alai Mountains, Pamir.
 FIG. 46. *Colias cocandica mongola* Alph., ♂; Schawyr Tannuola, Mongolia.
 FIG. 47. *Colias cocandica*, ♂, under side; Trans-Alai Mountains, Pamir.
 FIG. 48. *Colias eluesi* Röber, ♀; Tagalang Pass, Ladakh.
 FIG. 49. " " " ♂; Tagalang Pass, Ladakh.

NOTE: Figures 1-37 are from the Carnegie Museum Collection. Figures 38-49 are from the collection of A. Avinoff, deposited in the Carnegie Museum.



EXPLANATION OF PLATE XXVIII.

All specimens are from Southampton Island and in the collection of the Carnegie Museum.

- FIG. 1. *Brenthis frigga* (Thunberg), ♂.
 FIG. 2. " " " ♀.
 FIG. 3. " " " ♂, under side.
 FIG. 4. *Brenthis butleri* (Edwards), ♂.
 FIG. 5. " " " ♀.
 FIG. 6. " " " ♂, under side.
 FIG. 7. *Brenthis polaris* (Boisd.), ♂.
 FIG. 8. " " " ♀.
 FIG. 9. *Brenthis improba* (Butler), ♂.
 FIG. 10. " " " ♀.
 FIG. 11. " " " ♀, under side.
 FIG. 12. *Eneis arctica* Gibson, ♂.
 FIG. 13. " " " ♂.
 FIG. 14. " " " ♀.
 FIG. 15. " " " ♂, under side.
 FIG. 16. *Erebia rossi* (Curtis), ♂.
 FIG. 17. " " " ♀.
 FIG. 18. " " " ♀, under side.
 FIG. 19. *Chrysophanus feildeni* McLachlan, ♂.
 FIG. 20. " " " ♀.
 FIG. 21. " " " ♀, under side.
 FIG. 22. *Lycæna aquilo* (Boisd.), var. *suttoni* Holland, ♂.
 FIG. 23. " " " " " ♀.
 FIG. 24. " " " " " ♂, under side, type.
 FIG. 25. " " " " " ♀, under side.
 FIG. 26. *Anarta richardsoni* (Curtis), ♀.
 FIG. 27. " " " ♀.
 FIG. 28. *Agrotiphila quieta* (Hübner), ♂.
 FIG. 29. " " " ♀.
 FIG. 30. *Olethreutes inquietana* (Walker), ♂.
 FIG. 31. *Aspilates orCIFeraria labradoriata* (Möschler), ♂.
 FIG. 32. *Aphania frigidana* (Packard), ♂.
 FIG. 33. *Olethreutes mengelana* (Fernald), ♂.
 FIG. 34. *Polopeustis annulatella* (Zetterstedt), ♂.
 FIG. 35. *Crambus trichostomus* (Cristoph), ♂.
 FIG. 36. *Thiodia southamptonensis* Heinrich, sp. nov., ♂, paratype.
 FIG. 37. " " " " " ♂, paratype.
 FIG. 38. " " " " " ♂, type.
 FIG. 39. *Gypsonoma parryana* (Curtis), ♂.
 FIG. 40. *Platyptilia petrodactyla* (Walker), ♀.



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MEMOIRS
OF THE
CARNEGIE MUSEUM

VOL. XII

PART III

THE EXPLORATION OF SOUTHAMPTON ISLAND, HUDSON BAY

By GEORGE MIKSCH SUTTON

SPONSORED BY MR. JOHN BONNER SEMPLE

1929-1930

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By O. E. JENNINGS.

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ART. I. ALGÆ AND FUNGI OF SOUTHAMPTON ISLAND.

BY O. E. JENNINGS.

ALGÆ.

Family NOSTOCACEÆ.

1. **Nostoc muscorum** C. A. Agardh.

Nostoc muscorum C. A. Agardh, Dispositio algarum Sveciæ, p. 44 (1812).

Minute colonies of this species were found in the axils of the leaves of the moss, *Drepanocladus fluitans*. It has been reported from numerous stations throughout the temperate and Arctic regions of North America.

2. **Nostoc commune** Vaucher.

Nostoc commune Vaucher, Hist. d. Conferves d'eau douce, p. 222 (1803).

This collection consists of small, spherical, gelatinous colonies found among tufts of mosses. It is a common species ranging from the West Indies, Mexico, and Hawaii to various localities in arctic North America.

FUNGI.

Family AGARICACEÆ.

1. **Russula emetica** (Schaeffer) Persoon.

Agaricus emeticus Schaeffer, Fungi Bavar. 4:9 (1774).

Russula emetica Persoon, Obs. Mycol. 1:100 (1796).

This red-capped *Russula* occurs commonly throughout temperate Europe and North America and has been reported from as far north as Greenland.

Collected July 27, 1930.

2. *Russula* sp.

This specimen is not capable of specific determination. It apparently represents some pale-pink-capped species, and may, possibly, be a pale form of *Russula emetica*.

Collected July 27, 1930.

3. *Lactarius* sp.

There is insufficient data with this specimen to permit identification.

4. *Tubaria furfuracea* (Persoon) Smith.

Agaricus furfuraceus Persoon, Synop. Fungi, p. 454 (1801).

Tubaria furfuracea Smith, Seemann's Journ. 8:219 (1870).

Pileus light brown, becoming dark umber when dry, curved downwards at the margin. Stem cartilaginous, fistulose, paler than the cap, and tending towards light yellow above. Gills sinuate or arcuate-decurrent. Spores rusty brown, elliptical, smooth, about $5 \times 8-9 \mu$.

Collected July 27, 1930.

5. *Cortinarius* sp.

Insufficient data for specific determination.

Collected on Seal Point, autumn of 1929.

6. *Psathyrella disseminata* (Persoon) Fries.

Agaricus disseminatus Persoon, Synop. Fung., p. 403 (1801).

Psathyrella disseminata Fries, Systema Mycol., p. 305 (1821).

This is a common and widely distributed species ranging from Tasmania and South Africa to Siberia and northern North America.

Collected July 27, 1930.

7. *Hygrophorus hudsonianus* Jennings, sp. nov.

General color, a dull corn yellow. Pileus 0.5-3.0 cm. broad, plane, or centrally and marginally depressed, glabrous but not shining, fading to a pale yellow when dry, viscid and rubbery-cartilaginous when moist. Gills sub-arcuate, strongly decurrent, distant, intervenose, wide, thick, waxy, when dry not fading so much as does the pileus. Stem about 1-2.5 cm. long, 1.5-2 mm. thick, straight or curving upwards, cartilaginous, hollow, when dry pale yellow to almost white, dull, minutely powdery puberulent, slightly enlarged and matted with white cobwebby mycelium at the base. Spores elliptical, 4-5 by 5-8 μ , smooth, hyaline, rather thin-walled.

Collected by Dr. George M. Sutton, Southampton Island, 1930.

TYPE in the Carnegie Museum Herbarium.

Fungus flavus. Pileus planus vel centro depressus, 0.5-3.0 cm. latus, glaber, humectato viscidulus cartilagineusque, siccio albolutescens. Lamellae distantes, grossae, crassae, decurrentes. Stipes circa 1-2.5 cm. x 1.5-2.0 mm., cartilagineus, fistulosus, pulveraceo-puberulus. Sporidia elliptica, 4-5 x 5-8 μ , glabra, hyalina.

When moistened the fungus quickly revives and becomes cartilaginous and viscid, soon taking on a dark umber color which is retained when the fungus is again dried. The plants arise from the brown peaty portions of tufts of the moss *Dicranum fuscescens*. The

species seems nearest to *Hygrophorus nitidus* Berkeley & Curtis (*Hydrocybe nitida* Murrill), but it differs from the latter species in having a plane or depressed pileus and a puberulent stem.

Family LYCOPERDACEÆ.

8. *Calvatia cretacea* (Berkeley) Lloyd.

Lycoperdon cretaceum Berkeley, Journ. Linn. Soc., 17:15 (1878).

Calvatia borealis Th. Fries, Zur Kennt. Gasteromyc. Fl. Forne Lappm., p. 238 (1914).

Calvatia cretacea Lloyd, Myc. Notes No. 46, p. 650 (1917).

This is the arctic species of puff-ball reported from Lapland; and, in arctic America, from Bellot Island, Herschel Island, Bernard Harbor, Kay Point, and the Mackenzie River delta. Dr. Sutton's specimens from Southampton Island are from the most southerly station yet reported for the species.

EXPLANATION OF PLATE XXIX.

Mushrooms of Southampton Island from water-color sketches made by Dr. George Miksch Sutton during August, 1930.

- FIG. 1. Undetermined. Sketched at Coral Inlet, Southampton Island, Aug. 14, 1930.
FIG. 2. Undetermined. Sketched at Coral Inlet, Southampton Island, Aug. 14, 1930.
FIG. 3. *Russula* sp. Perhaps a faded *Russula emetica*. Sketched Aug. 21, 1930.
FIG. 4. *Russula* sp. Sketched at Coral Inlet, Southampton Island, Aug. 14, 1930.
FIG. 5. *Russula* sp. Sketched Aug. 21, 1930.
FIG. 6. *Hygrophorus* sp.? Sketched at Coral Inlet, Southampton Island, Aug. 14, 1930.
FIG. 7. *Lactarius* sp.? Sketched at Coral Inlet, Southampton Island, Aug. 14, 1930.
FIG. 8. Undetermined. Sketched at Coral Inlet, Southampton Island, Aug. 14, 1930.
FIG. 9. *Naucoria semiorbicularis* (Bull) Fr.? Sketched Aug. 21, 1930.
FIG. 10. *Russula emetica* (Schaeffer) Persoon. Sketched at Coral Inlet, Southampton Island, Aug. 14, 1930.
FIG. 11. *Amanitopsis* sp. "Underside almost pure white"—Sutton. Sketched Aug. 20, 1930.
FIG. 12. Undetermined. Sketched at Coral Inlet, Southampton Island, Aug. 14, 1930.
FIG. 13. *Cortinarius* sp.? Sketched at Coral Inlet, Southampton Island, Aug. 14, 1930.
FIG. 14. *Hygrophorus* sp.? Sketched Aug. 21, 1930.
FIG. 15. *Cantharellus* sp. Sketched Aug. 21, 1930.
FIG. 16. *Entoloma* sp.? Sketched at Coral Inlet, Southampton Island, Aug. 14, 1930.
FIG. 17. Undetermined. Sketched at Coral Inlet, Southampton Island, Aug. 14, 1930.
FIG. 18. *Naucoria* sp.? "Underside greenish-olive"—Sutton. Sketched Aug. 20, 1930.
FIG. 19. Undetermined. Sketched at Coral Inlet, Southampton Island, Aug. 14, 1930.
FIG. 20. Undetermined. Sketched Aug. 20, 1930.



ART. II. LICHENES (LICHENS) OF SOUTHAMPTON ISLAND.

By LUCY C. RAUP.

The plant collections made by Dr. George M. Sutton on Southampton Island during 1929 and 1930 included 115 packets of lichens. This material was determined by the writer and the following list results from that study.

The majority of the specimens are in good condition and, as a rule, good fruit is present where it is necessary for the determinations. However, there are six or seven species represented either by primary thalli only or by thalli and fruit from which it is impossible to obtain spores. This material remains undetermined. All of the lichens were collected between the first and thirtieth of July, 1930.

The list contains twenty-two species. Zahlbruckner's *Catalogus Lichenum Universalis* has been used as the authority for nomenclature and sequence. All of the material has been identified at the Farlow Herbarium, Harvard University, and consequently has been compared with the available authentic material to be found there.

LIST OF SPECIES.

Family SPHEROPHORACEÆ.

1. *Sphærophorus fragilis* Persoon.

Family CLADONIACEÆ.

2. *Cladonia deformis* Hoffmann.
3. *Cladonia gracilis* (Linnaeus) Willdenow.
4. *Cladonia pyxidata* (Linnaeus) Fries.
5. *Cladonia* sp.
6. *Stereocaulon paschale* Hoffmann.

Family GYROPHORACEÆ.

7. *Gyrophora proboscidea* Acharius.

Family PERTUSARIACEÆ.

8. *Pertusaria* sp.

Family LECANORACEÆ.

9. *Hæmotomma ventosum* Massalongo.

Family PARMELIACEÆ.

- 10. *Parmelia saxatilis* Acharius.
- 11. *Cetraria fahlunensis* Schaerer.
- 12. *Cetraria juniperina* Acharius.
- 13. *Cetraria cucullata* Acharius.
- 14. *Cetraria hiascens* Th. Fries.
- 15. *Cetraria islandica* Acharius.
- 16. *Cetraria nivalis* Acharius.

Family USNEACEÆ.

- 17. *Dactylina arctica* Nylander.
- 18. *Alectoria chalybeiformis* Röhling.
- 19. *Alectoria ochroleuca* Massalonga.
- 20. *Usnea hirta* Wiggers.
- 21. *Usnea trichodea* Acharius.
- 22. *Thamnia vermicularis* (Swartz) Schaerer, var. *taurica* Schaerer.

Family CALOPLACACEÆ.

- 23. *Caloplaca elegans* Th. Fries.

Family PHYSCIACEÆ.

- 24. *Physcia cæsia* Hampe apud Fuernrohr.

ART. III. BRYOPHYTA (BRYOPHYTES) OF SOUTHAMPTON ISLAND.

By O. E. JENNINGS.

The Bryophytes (Mosses and Hepatics) enumerated in the following list were collected by Dr. George Miksch Sutton on Southampton Island, Hudson Bay, 1929-1930, on an expedition sponsored by Mr. John B. Semple. The specimens are mostly sterile and, in many cases, are rather fragmentary, having been extricated from among the matted tufts of other species of mosses. Six of the seven species of Hepatics were thus obtained, they being minute forms easily overlooked in the field, especially when growing amongst tufts of relatively much larger mosses.

MUSCI (MOSES).

The collections of mosses obtained by Dr. Sutton on Southampton Island consist of thirty-six packets, only three of which contain specimens in fruit. There were represented, altogether, twenty-seven species. Most of the species are those of general distribution through the temperate or cooler temperate regions and extending here and there into boreal localities. Four of the species (*Dicranum granlandicum*, *Voitia hyperborea*, *Cinclidium arcticum*, and *Polytrichum hyperboreum*) are distinctly Arctic in their distribution, and it is of note that two of these, *Voitia hyperborea* and *Cinclidium arcticum*, apparently find on Southampton Island the most southerly extension of range yet recorded for them. *Seligeria brevifolia* is apparently new to North America, and one species is described as new, *Pylaisia Suttoni*.

Family SPHAGNACEÆ.

1. *Sphagnum fimbriatum* Wilson; Hooker f. & Wilson.

Sphagnum fimbriatum Wilson; Hooker f. & Wilson, in Hooker f. Fl. Antaret., p. 398 (1846).

A bog moss very widely distributed in the North and South Temperate regions.

Family SELIGERIACEÆ.

2. *Seligeria brevifolia* (Lindberg) Lindberg.

Seligeria pusilla var. *brevifolia* Lindb., Ofv. K. Yet.-Ak. Forh. 21:187 (1864).

Seligeria brevifolia Lindberg, K.S. Yet.-Ak. Handl. 28: (No. 10): 84 (1890).

This species ranges from Switzerland to Siberia, Finland, and Scandinavia. It has not been reported from Greenland or Alaska, and, so far as we can find, Dr. Sutton's specimens mark the first indication of its presence in the New World.

Collected July 30, 1930.

Family DICRANACEÆ.

3. *Dicranum Blyttii* Bruch, Schimper, & Guembel.

Dicranum Blyttii Bruch, Schimper, & Guembel, Bryol. Eur. Fasc. 37/40:26. t. 16 (1847).

This moss grows in dense tufts forming a peaty turf and it ranges from the Alps to

England, Finland, and Spitzbergen; and, in North America, from New England to Anticosti and Greenland, and from Idaho to the Yukon.

Collected July 10-12, 1930.

4. *Dicranum fuscescens* Turner.

Dicranum fuscescens Turner, Musc. Hibern., p. 60, Pl. 5, fig. 1 (1804).

The range of this moss is from the Caucasus to Japan, northern Siberia, and Spitzbergen; and, in North America, from Newfoundland to Greenland, and from Oregon to Alaska.

Collected July 28, 1930.

5. *Dicranum grœnlandicum* Bridel.

Dicranum grœnlandicum Bridel, Musc. Recent. Suppl. 4:68 (1819).

Dicranum labradoricum C. Mueller, Synop. Musc. 1:366 (1848).

The specimens, which were collected July 10-12, 1930, form a dense, peaty turf. The characters are those of the species, with the exception that the leaves are a little shorter, being but 2-2.5 mm. long.

This is an almost entirely Arctic species reported from various localities along the Arctic shores and islands of Asia, Europe, and North America, where, according to Brotherus, it ranges northwards to 76° 51', and southwards to Newfoundland and the higher mountains of New England.

Family GRIMMIACEÆ.

6. *Grimmia alpicola* Swartz.

Grimmia alpicola Swartz, Musc. Succ., pp. 27 and 81, Pl. 1, fig. 1 (1799).

Grimmia apocarpa var. *alpicola* Hooker and Taylor, Musc. brit., p. 88 (1818).

The specimen consists of a few fragments separated from among some other mosses and lichens. The species occurs in the mountains of central Europe and in the Sierra Nevada of North America, and ranges northwards to Finland, Spitzbergen, Greenland, and Alaska.

7. *Rhacomitrium lanuginosum* (Ehrhart; Hedwig) Bridel.

Bryum hypnoides var. *lanuginosum* Ehrhart, Beitr. z. Naturk. 2:95 and 186 (1788).

Trichostomum lanuginosum Hedwig, Descr. Musc. Frond. 3:3, Pl. 2 (1792).

Rhacomitrium lanuginosum Bridel, Mant. M., p. 79 (1819).

This attractive light colored moss, with silvery hair-points to the leaves, was the most abundant species among Dr. Sutton's collections. Four different collections were made on July 26, 1930. The species is cosmopolitan in suitable habitats, occurring from Fuegia and Australia to various localities in the Arctic regions.

Family SPLACHNACEÆ.

8. *Voitia hyperborea* Greville and Arnold.

Voitia hyperborea Greville & Arnold, Act. Soc. Wern. 4:109, Pl. 7 (1825).

Voitia nivalis var. *hyperborea* W. P. Schimper, Syn. Musc. Eur., Ed. 2, p. 21 (1876).

This interesting Arctic moss was collected July 10-12, 1930, intimately associated about half-and-half in tufts with *Bryum pendulum* (Hornschuch) W. P. Schimper, which it super-

ficially rather closely resembles, excepting for its darker and more rounded capsules and more lustrous yellowish setæ.

Thus far the moss has been reported from Nova Zembla, Spitzbergen, Grant Island, Melville Island, and Greenland. Dr. Sutton's station is apparently the most southerly yet discovered.

Family BRYACEÆ.

9. *Webera cruda* var. *minor* W. P. Schimper.

Webera cruda var. *minor* W. P. Schimper, Coroll. Bry. Eur., p. 65 (1856).

Pohlia cruda var. *minor* Moeller, Foertechn. Sk. Voxt., II, Mossor, p. 32 (1907).

A small tuft of light green color. The species occurs in the higher mountains of Europe, and ranges to Finland. In America it ranges from Minnesota to Labrador and Greenland.

Collected July 21, 1930.

10. *Bryum pendulum* (Hornschuch) W. P. Schimper.

Ptychostomum pendulum Hornschuch, Fl., Syll. I, p. 64 (1822).

Bryum pendulum W. P. Schimper, Coroll. Bryol. Eur., p. 70 (1856).

This species ranges from the Caucasus and the Himalayas northwards to the Arctic. It occurs on Spitzbergen; and, in North America, it ranges from the northern United States to Greenland and the Mackenzie River delta.

The specimen is intimately mixed with *Voitia hyperborea* Greville and Arnold.

Family MNIACEÆ.

11. *Cinclidium arcticum* (Bruch, Schimper, and Guembel) W. P. Schimper.

Mnium (Cinclidium) arcticum Bruch, Schimper, and Guembel, Bryol. Eur., fasc. 31 (Vol. IV), Suppl. 1, p. 2, Pl. 2 (1846).

Cinclidium arcticum W. P. Schimper, Coroll. Bryol. Eur. p. 80 (1860).

Dr. Sutton made two collections of this moss; July 10-12, and July 17, 1930. Below the bright yellowish-green tips, the tufts take on a somewhat purplish brown, a quite unusual color.

This species is purely Arctic. It has been found in Arctic Siberia, Finland, Lapland, Bear Island¹, Spitzbergen, and Arctic North America. The most commonly reported species of *Cinclidium* for Arctic North America is *C. subrotundum* Lindberg (Newfoundland, Labrador, Greenland, Alaska) but the Southampton Island specimens seem rather to belong to *C. arcticum*. This is the most southern record for the species.

Family AULACOMNIACEÆ.

12. *Aulacomnium palustre* (Linnæus) Schwaegrichen.

Mnium palustre Linnæus, Sp. plant. 1: Ed. 2: 1110 (1753).

Aulacomnium palustre Schwaegrichen, Musc. frond., Suppl. 3, pt. 1, fasc. 1, Pl. 216 (1827).

This moss occurs commonly in suitably cool, moist, or swampy habitats over almost the whole earth. Northwards it ranges into Arctic Eurasia, and it has been reported from Spitzbergen, Greenland, Baffin's Land, Herschel Island, and Arctic Alaska.

¹The Bear Island referred to in this article is situated about half-way between Norway and Spitzbergen. This is not the Bear Island mentioned in Dr. Sutton's paper.

13. **Aulacomnium turgidum** (Wahlenberg) Schwaegrichen.

Mnium turgidum Wahlenberg, Fl. lapp. p. 351, Pl. 23 (1812).

Aulacomnium turgidum Schwaegrichen, Sp. Musc. frond., Suppl. 3, pt. 1, fasc. 1 (1827).

The leaves of the specimens collected July 10-12, 1930, are somewhat shorter (about 2 mm. long and 1.25 mm. wide) than described for the species, but otherwise the specimens seem quite typical.

The species is mainly Arctic in distribution, occurring from the Alps to Spitzbergen; from Japan to Arctic Siberia; and from the Adirondacks to Greenland, Melville Island, and Alaska.

Family ORTHOTRICHACEÆ.

14. **Orthotrichum anomalum** Hedwig.

Orthotrichum anomalum Hedwig, in Timm, Prodr., No. 734 (1788).

Collected July 26, 1930. This is a common species of Eurasia, northern United States, and Canada, reaching to the north as far as Greenland and Alaska.

Family THUIDIACEÆ.

15. **Thuidium abietinum** (Linnæus) Bruch, Schimper, and Guembel.

Hypnum abietinum Linnæus, Sp. pl., p. 1126 (1753).

Thuidium abietinum Bruch, Schimper, and Guembel, Bryol. Eur., fasc. 49-51, Vol. 5, p. 9, Pl. 5 (1852).

Some fine specimens of this moss were collected by Dr. Sutton on June 27, 1930, although all are sterile. In Eurasia it ranges from Kashmir and the Caucasus, north and west to the Arctic and Atlantic shores, and, in North America, from the northern United States to Greenland, Coronation Gulf, and Alaska.

Family HYPNACEÆ.

16. **Eurhynchium pulchellum** (Hedwig) Jennings, Manual Mosses W. Penn., p. 350 (1913)

Hypnum strigosum Hoffman, Deutsch. Fl. 2:76 (1796).

Eurhynchium strigosum (Hoffman) Bruch, Schimper, and Guembel, Bryol. Eur., fasc. 57-61, Vol. 5, Pl. 519 (1854).

Eurhynchium pulchellum Jennings, Man. Mosses W. Penn., p. 350 (1913).

Widely distributed through the North Temperate regions and extending its range northwards to Siberia, Finland, Greenland, Anticosti, Coronation Gulf, and Cape Barrow.

Collected July 26, 1930.

17. **Brachythecium albicans** (Necker) Bruch, Schimper, and Guembel.

Hypnum albicans Necker, Meth. Musc., p. 180, No. 36 (1771).

Brachythecium albicans Bruch, Schimper, and Guembel, Bryol. Eur., fasc. 52-54, Pl. 553 (1853).

This species is rather widely distributed through the cooler and mountainous parts of Europe northwards to Finland; and, in North America, it extends from Cape Breton Island and California northwards to Greenland and Alaska.

18. **Camptothecium lutescens** (Hudson) Bruch, Schimper, and Guembel.

Hypnum lutescens Hudson, Fl. Angl., p. 421 (1762).

Camptothecium lutescens Bruch, Schimper, and Guembel, Bryol. Eur., Fasc. 52-54, Pl. 558 (1853).

Distributed through Europe northwards to Finland, this moss occurs, in America, chiefly west of the Rockies, from California northwards to Alaska and eastwards to Coronation Gulf, also Greenland.

19. **Camptothecium nitens** (Schreber) W. P. Schimper.

Hypnum nitens Schreber, Spicil. Fl. Lips., p. 92 (1771).

Camptothecium nitens W. P. Schimper, Synop. Muse. Eur., Ed. I, p. 530 (1860).

This species is widely distributed through Eurasia and cool Temperate North America, reaching to the north as far as northern Siberia, Finland, Bear Island, Spitzbergen, Greenland, Melville Island, Northwest Territory, and Alaska.

20. **Drepanocladus uncinatus** (Hedwig) Warnstorf.

Hypnum uncinatum Hedwig, Sp. Muse. Frond. 4:65, Pl. 25 (1797).

Drepanocladus uncinatus Warnstorf, Beih., Bot. Centralbl. 13:417 (1903).

This moss, common in cool shaded places in Temperate regions of the Northern Hemisphere, extends into both the Arctic and Antaretic zones. It occurs on Spitzbergen, Greenland, and has been reported from various localities about Hudson Bay and westward to Alaska.

21. **Drepanocladus Sendtneri** (Schimper) Warnstorf.

Hypnum Sendtneri Schimper, Muse. Eur. Nov., fasc. 3-4, Hypnum, p. 2, Pl. 2 (1866).

Drepanocladus Sendtneri Warnstorf, Beih., Bot., Centralbl. 13:400 (1903).

The range of this moss is rather general across Temperate parts of Eurasia, north to the Arctic. In North America it extends from the northern part of the United States through Canada to the Arctic waters at Dolphin and Union straits about nine hundred miles west of Southampton Island. Dr. Sutton's collection apparently considerably extends the range of the species into mid-northernmost Canada.

Collected July 6, 1930.

22. **Drepanocladus fluitans** (Linnæus, Hedwig) Warnstorf.

Hypnum fluitans Linnæus, Fl. Suec. (Ed. 2), p. 899 (1755).

Hypnum fluitans Hedwig, Sp. Muse. Frond., p. 296 (1801).

Drepanocladus fluitans Warnstorf, Beih., Bot. Centralbl. 13:404 (1903).

This species, which, in one or another of its various forms extends from New Zealand to the Arctic, is known from the Southampton Island collections thus far only from a single branch extracted from among other mosses collected on July 26, 1930. The species, in its inclusive sense, extends to Finland and Spitzbergen, Greenland, Labrador, Bernard Harbor in northwestern Arctic Canada, and Alaska.

23. *Campyllum polygamum* (Bruch, Schimper, and Guembel) Bryhn.

Amblystegium polygamum Bruch, Schimper, and Guembel, Bryol. Eur. 55-56, p. 16, Pl. 10 (1853).

Campyllum polygamum Bryhn, D.K.N. Vid. Selsk. Skrift., p. 61 (1893).

The range of this species is from Japan and Siberia through central and western Europe to Finland, Bear Island, and Spitzbergen; and in America, from Virginia, Wisconsin, and Washington, to Labrador, Greenland, and the Yukon district (Canada).

24. *Pylaisia Suttoni* Jennings, sp. nov. (Pl. XXX, figs. 1-19).

Yellowish-green, lustrous; in thin closely interwoven mats. Stems prostrate, irregularly pinnate, bearing short, ascending, to erect, branches which are about 5-7 mm. long. Stem-leaves mostly 0.6-0.8 mm. long, slenderly acuminate from a narrowly triangular-ovate base, entire to subdenticulate towards the apex; the margin plane, the base sub-auriculate, ecostate. Branch-leaves ecostate; 0.6-1.0 mm. long, 0.25-0.3 mm. wide; ovate, slenderly acuminate, somewhat secund or, in part, somewhat falcately secund, marginally plane, entire or sometimes faintly denticulate towards apex. In cross-section the outer one or two layers of cells of the stem are small and densely incrassate, the inner much larger and thinner walled. The median and upper leaf-cells are relatively thick-walled, linear-vermicular, about 1:15-20, the median being about 60-80 long; the basal cells shorter and wider, towards the alar portion becoming oblong-hexagonal or rhomboid-hexagonal. The alar cells of the stem-leaves are few in number, somewhat incrassate, and about 1:2-4. The alar cells of the branch-leaves form an indistinct patch of about 7-12 more or less quadrate and sub-inflated hyaline cells. The inner perichaetial leaves are rather broadly ovate and clasping, slenderly acuminate, and 1.0-1.3 mm. long. The seta is castaneous, mostly erect, or erect-ascending; 1-1.2 mm. long, smooth, and when dry dextrorsely twisted. The capsules are oblique or slightly arcuate, smooth, castaneous, 1.1-1.5 mm. long, about 3:1, narrowly oblong-cylindric, rather gradually tapering at the base, the mature capsules usually slightly constricted below the mouth when dry. Operculum a low obtuse or mammillate cone about as wide as high. Peristome hypnoid; the teeth lance-subulate, pale yellow, finely cross-striolate below, hyaline and papillose above; the segments narrower but a little longer than the teeth, carinately cleft between the articulations, rising from a basal membrane which comprises two-fifths of the height of the inner peristome; the cilia 2 in number but very short and rudimentary. Exothecal cells incrassate and rather regularly quadrate. Spores smooth, pale yellowish-pellucid, 12-17 μ in diameter.

Ramulorum folia minuta, 0.6-1.0 mm. longa, 0.25-0.3 mm. lata, plus minusve falcato-secunda, ovata, acuminata, plana, superne integerrima vel indistinct denticulata, inferne integerrima, ecostata. *Foliorum ramulorum cellulae* mediane et superiores longe lineari-vermiculares, circa 1:15-20, basiales latiores et breviores, ad angulos paucae, plus minusve rhomboideo-hexagonae, alares circa 7-12, plus minusve quadrate, leviter inflatae. *Perichaetii folia* interna ovata, vaginantia, anguste acuminata, 1-1.3 mm. longa. Operculum brevis, convexo-conicum vel mammillatum, obtusum. Peristomii dentes pallide lutescentes, apice hyalini. Peristomii interni dentes articulosi quam dentes externi leviter longiores. Cilia 2, brevissima, plus minusve imperfecta.

It is with great pleasure that this species is named after its collector, Dr. George Miksch Sutton. It appears to be most nearly related to *Pylaisia polyantha* (Schreber) Bryologia Europaea, but the leaf-cells are more linear, and those at the basal angles are less distinctly

quadrate and do not form so distinct a group. The capsule of this species is usually slightly curved and the operculum is shorter and more obtuse than that of *P. polyantha*.

Forming thin, closely interwoven mats, apparently over a thin layer of humus on rocks. The TYPE specimens are deposited in the Herbarium of the Carnegie Museum.

25. **Hypnum callichroum** (Bridel) C. Mueller.

Stereodon callichroum Bridel, Bryol. Univ. 2:631 (1827).

Hypnum callichroum C. Mueller, Syn. 2:294 (1851).

A few small sprigs of a moss which was assigned to this species were discovered among other mosses. The specimens are sterile and have leaves about 0.5 to 0.6 mm. long. The species extends from Siberia, through alpine districts of Europe to Finland and Spitzbergen, and has been reported in America from Greenland, Nova Scotia, and Alaska.

26. **Calliergonella Schreberi** (Willdenow) Grout.

Hypnum Schreberi Willdenow. Prodr. Fl. Berol. p. 325 (1787).

Hypnum Schreberi Bruch, Schimper, and Guembel, Bryol. Eur. fasc. 57-61, Pl. 620 (1854).

Pleurozium Schreberi Mitten. Journ. Linn. Soc. 12:537 (1869).

Calliergonella Schreberi Grout, Moss. Fl. N. Am. 3:103 (1931).

This beautiful moss is represented by a collection made on July 6, 1930. The species has a wide distribution in Temperate habitats from Japan to the British Isles and north to Spitzbergen; and, in America, from Ecuador to Greenland, Labrador, and Alaska.

Family POLYTRICHACEÆ.

27. **Polytrichum hyperboreum** R. Brown.

Polytrichum hyperboreum R. Brown, Suppl. Parry's Voyage p. 294, No. 69, 1824, and Flora, Pt. 2, p. 114, no. 69 (1824); (Including *Polytrichum boreale* Kindberg. Bih. K. Sv. Vet-Ak. Handl. Bd. 7, No. 9, p. 52 (1883).

The specimens consist of scattered sterile shoots among other mosses, and are evidently of the form described by Kindberg as *P. boreale*, in which the lamina are indistinctly serrulate above. Most authors do not now recognize this as sufficiently important to warrant the separation of such specimens from the typical form of the species.

The species was originally described by Robert Brown, in 1824, from specimens collected on the Parry Expedition to arctic America. The present known distribution includes localities along the Arctic coast of Siberia, Nova Zembla, Finland, Spitzbergen, Greenland, Melville Island, Labrador, the Yukon district (Canada), and Alaska.

HEPATICÆ (HEPATIC OR LIVERWORTS).

The specimens of Hepatics herewith listed were all found intermixed in tufts of mosses. They are mostly small and were usually growing well down in the tufts and overtopped by the mosses. In the identification of the Hepatics I wish to acknowledge valuable assistance in determining the specimens by Dr. Leslie H. Lanfear.

Family RICCARDIACEÆ.

1. *Riccardia* sp.

There were a few bits of this Hepatic mixed with *Cephaloziella Hampeana* var. *subtilis* (Velenovsky) McVicar.

Family LOPHOZIACEÆ.

2. *Lophozia obtusa* (Lindberg) Evans.

Jungermannia obtusa Lindberg, Musci Scand., p. 7 (1869).

Lophozia obtusa Evans, Proc. Wash. Acad. Sci., 2:303 (1900).

The few specimens found were separated from among the stems of a tuft of mosses and were all sterile. The species is Northern, and has been reported from various localities ranging from alpine regions in Italy to Finland, Sweden, Norway, and, in North America, from Ellesmere Land and Alaska.

Family CEPHALOZIACEÆ.

3. *Cephalozia ambigua* Massalongo.

Cephalozia bicuspidata var. *atra* Arnell, Lebermoosst. Nörd., Norv. p. 10 (1892).

Cephalozia bicuspidata var. *arctica* Bryhn and Kaalaas, Rpt. Sec. Norv. Arct. Exped. "Fram," Bryophyta, p. 44 (1906).

Cephalozia ambigua Massalongo, Spec. Ital. gen. Ceph., Malpighia 21:22 (1907); K. Mueller, Rabenhorst Krypt. Fl. II, p. 26 (1912).

This is a minute arctic-alpine species. Two specimens were found among the tufts of mosses collected by Dr. Sutton. One specimen is fruiting and has stems 4-7 mm. long. The other specimen was sterile and was intermixed with tufts of the moss *Aulacomnium palustre*. The latter specimen of hepatic had leaves more or less acutely 2-5-lobed, with obtuse sinuses; the amphigastria were lanceolate and scattering; and the leaf-cells were about 16-21 μ in diameter.

Family CEPHALOZIELLACEÆ.

4. *Cephaloziella Hampeana* var. *subtilis* (Velenovsky) McVicar.

Cephalozia subtilis Velenovsky, Jät. ceské, Tiel I, p. 37 (1901).

Cephalozia divaricata var. *Curnowii* Slater, MS.

Cephaloziella rubella var. *subtilis* K. Mueller, Rabenh. Krypt. Fl. II, p. 57 (1913).

Cephaloziella Hampeana var. *subtilis* McVicar, Stud. Handb. Brit. Hep., 2nd Edit., p. 284 (1926).

This variety was first described from central Europe in 1901 and has since been reported from various localities in central Europe and the British Isles, but has not heretofore been reported from America. The plants form a scant, dark-colored mat on raw peat. The leaves are divided three-fourths of the way to the base into two lobes each. The lobes are about 7-12 cells wide at the base, somewhat more than described by McVicar (5-8 or more), and the cells measure about 13-16 μ in diameter. The specimens were intermixed with a few bits of *Riccardia* sp.

Collected July 30, 1930.

Family PTILIDIACEÆ.

5. *Blepharostoma tricophyllum* (Linnæus) Dumortier.

Jungermannia tricophylla Linnæus, Sp. Plant., p. 1135 (1753).

Blepharostoma trichophyllum Dumortier, Rec. d'obs., p. 18 (1835).

A few bits of this Hepatic were found in a tuft of *Dicranum fuscescens* in company with bits of *Scapania compacta*.

Collected July 10-12, 1930.

6. *Ptilidium ciliare* (Linnæus) Hampe.

Jungermannia ciliaris Linnæus, Sp. Pl., p. 1134 (1753).

Ptilidium ciliare Hampe, Prod. Fl. Herc., p. 76 (1836).

Blepharozia ciliaris Dumortier, Rec. d'obs., p. 16 (1835).

The plants were found in two different tufts of mosses, in one case somewhat mixed with the Reindeer Lichen.

Collected July 1, and July 10-12, 1930.

Family SCAPANIACEÆ.

7. *Scapania compacta* (Roth) Dumortier.

Jungermannia compacta Roth, Tent. Fl. Germ., p. 375 (1800).

Jungermannia resupinata Hooker, Brit. Jungerm., Pl. 23 (1812).

Scapania compacta Dumortier, Rec. d'obs., p. 14 (1835).

This Hepatic is stated (McVicar) to mostly occur on rocky banks, rocks, and old walls; but Dr. Sutton's specimen from Southampton Island was found in a tuft of *Dicranum fuscescens* and *Blepharostoma tricophyllum* and apparently on peaty soil. The lobes of the leaves in these specimens are subequal, mostly entire; the leaf-cells are 18-25 μ in diameter, smooth, and with rather prominent trigones.

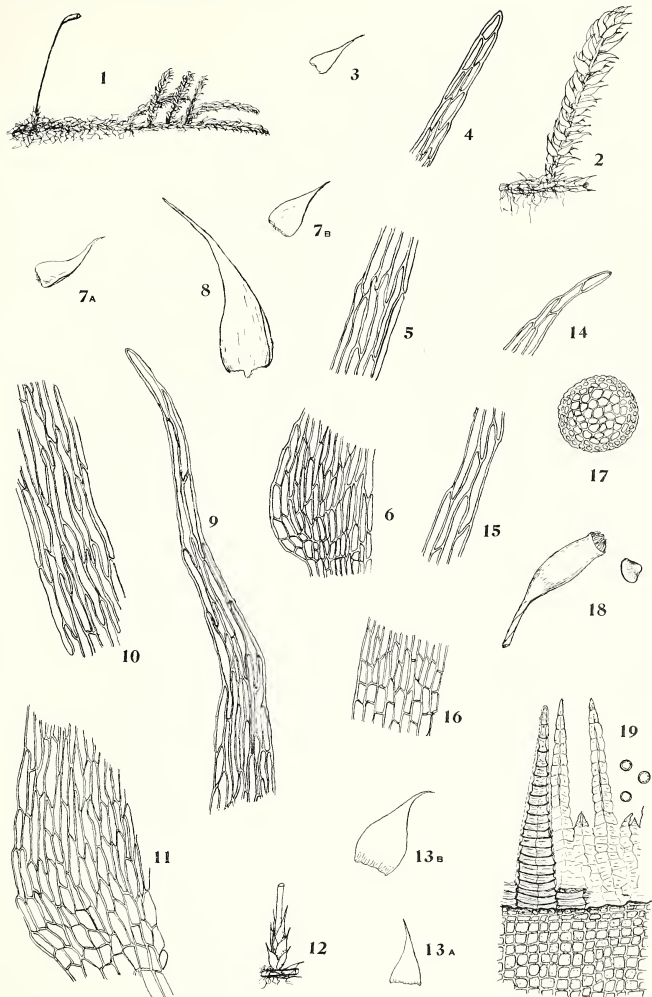
Collected June 10-12, 1930.

EXPLANATION OF PLATE XXX.

Pylaisia Suttoni Jennings, sp. nov.

- FIG. 1. Individual plant, enlarged 2 diameters.
FIG. 2. Branch, enlarged 10 diameters.
FIG. 3. Stem-leaf, enlarged 30 diameters.
FIG. 4. Apex of stem-leaf, enlarged 320 diameters.
FIG. 5. Median cells of a stem-leaf, enlarged 320 diameters.
FIG. 6. Basal cells of a stem-leaf, enlarged 320 diameters.
FIG. 7a and 7b. Branch-leaves, enlarged 30 diameters.
FIG. 8. Branch-leaf, enlarged 120 diameters.
FIG. 9. Apex of a branch-leaf, enlarged 350 diameters.
FIG. 10. Median cells of a branch-leaf, enlarged 350 diameters.
FIG. 11. Cells at basal angle of a branch-leaf, enlarged 350 diameters.
FIG. 12. Perichætal leaves at base of seta, enlarged 10 diameters.
FIG. 13a. Lower (smaller) perichætal leaf, enlarged 30 diameters.
FIG. 13b. Upper (larger) perichætal leaf, enlarged 30 diameters.
FIG. 14. Apex of a perichætal leaf, enlarged 320 diameters.
FIG. 15. Median cells of same, enlarged 320 diameters.
FIG. 16. Basal angle of same, enlarged 320 diameters.
FIG. 17. Cross-section of seta, enlarged 150 diameters.
FIG. 18. Capsule and detached operculum, enlarged 15 diameters.
FIG. 19. Piece of mouth of capsule showing exothecal cells, a tooth of the outer peristome, a piece of the inner peristome with two segments, and three spores, all enlarged 150 diameters.

Drawings, by O. E. Jennings, from specimens collected by George M. Sutton on Southampton Island, Hudson Bay, and deposited in the Herbarium of the Carnegie Museum.



ART. IV. PTERIDOPHYTA AND SPERMATOPHYTA OF SOUTHAMPTON ISLAND.

By HUGH M. RAUP.

A substantial collection of the vascular flora of Southampton Island and neighboring points was made by Dr. George M. Sutton in 1929 and 1930. This collection, consisting of four hundred and fifty-five herbarium sheets, was entrusted to the writer for the preparation of the following annotated list. One hundred and nine species and varieties are represented, while the specimens are distributed among the major groups as follows: Pteridophyta, 12; Monocotyledoneae, 104; Archichlamydeae, 244; Metachlamydeae, 95. Nearly all of the specimens are well collected and preserved, and Dr. Sutton is to be congratulated not only upon the quality of the material, but also upon his having made notable additions to the known flora of the region.

The only published accounts of the flora of Southampton Island are based upon collections made in 1821 during the second expedition in command of Captain W. E. Parry. Records of these, involving only forty species, appeared in an appendix to Parry's narrative,¹ and were later incorporated, after study of the actual specimens, into H. G. Simmons' "*Survey of the Phytogeography of the Arctic American Archipelago*."² It will be seen, therefore, that Dr. Sutton's specimens include sixty-six additions to the known flora. Of the plants previously reported, only four fail to appear in the present collection: *Poa glauca* Vahl, *Luzula nivalis* (Laestadius) Beurling, *Arenaria Rossii* (R. Br.) Fenzl, and *Parrya arctica* R. Br. *Pleuropogon Sabinei* R. Brown, of the Parry Expedition reports, is somewhat doubtfully recorded from Sutton's collections (sterile specimens only); and *Oxytropis arctica* R. Brown, a name which appears in the earlier records and has been applied to more than one species, might be interpreted either as *Oxytropis Belli* (Britton) Palibine, or *Oxytropis hudsonica* (Greene) Fernald of the more recent treatments of this group.³ The opportunity for making such notable contributions to the knowledge of plant distribution in the Arctic has recently been emphasized by the late M. O. Malte,⁴ a leading authority upon the American Arctic flora. He made large collections on many islands, the flora of which would appear to be very small if we may judge by earlier records. When investigated by more experienced collectors, however, the islands yield a much richer harvest, as is shown in the present instance.

No attempt has been made to give the complete synonymy of the species listed, only those names being included which will make the notes referable to standard floras of temperate North America. A few citations of the recent literature which has been pertinent in the determination of the specimens are given, together with such notes on habitats as the collector made in the field. These notes are either ascribed to him directly or are placed in quotation marks. Unless otherwise stated, all species reported here are now recorded from Southampton Island for the first time.

¹Appendix to Capt. Parry's Journal of a Second Voyage, etc., in the Years 1821-22-23. London. 1825. pp. 383-411.

²Lunds Universitets Arsskrift, N. F., Afd. 2., Bd. 9., Nr. 19 (1913).

³Rhodora, xxx, 144-5 (1928).

⁴Ann. Repts. Nat'l. Mus. Can. for 1927, Bull. 56, pp. 31-2 (1929); and for 1928, Bull. 62, p. 13 (1929).

The writer wishes to express his appreciation for helpful criticisms and suggestions given him by the late Dr. M. O. Malte, then Chief Botanist at the National Museum of Canada, and by Professor M. L. Fernald and Mr. C. A. Weatherby of the Gray Herbarium of Harvard University. Most of the work was done at the Gray Herbarium during the writer's tenure of a National Research Fellowship in the Biological Sciences.

ARNOLD ARBORETUM, HARVARD UNIVERSITY,
MARCH, 1936

PTERIDOPHYTA.

Family POLYPODIACEÆ.

1. *Thelypteris fragrans* (Linnæus) Nieuwland.

Dryopteris fragrans (Linnæus) Schott.

Specimens in good fruit were collected at Southampton Island in late June and early July, and at Chesterfield Inlet in August and September.

Family EQUISETACEÆ.

2. *Equisetum arvense* Linnæus.

Sterile shoots with well-developed root-stocks collected July 23.

3. *Equisetum variegatum* Schleicher.

Sterile shoots with root-stocks collected during the third week in July.

Family LYCOPODIACEÆ.

4. *Lycopodium Selago* Linnæus.

Plants bearing gemmæ and old spore-cases collected during the first week in July.

SPERMATOPHYTA.

Family GRAMINEÆ.

5. *Festuca brachyphylla* Schultes.

Festuca brevifolia R. Brown, not Muhlenberg; *F. ovina* Linnæus, var. *brevifolia* (R. Brown) Hackel; *F. supina* of Am. authors, not Schkuhr.

Several specimens, all in anthesis, were collected Aug. 2. See Rhodora ,XXX, 250-251 (1935). Previously known from Southampton Island.

6. *Poa rigens* Hartman.

Poa arctica Robert Brown.

Collected in anthesis July 20, 21, and with maturing spikelets, Aug. 4. For a recent treatment of the synonymy of this species see Holmberg, *Skandinavien Flora*, Häfte 2, pp. 211-12 (1926). Previously known from Southampton Island.

7. **Pleuropogon Sabinei** R. Brown. (?)

Sterile shoots collected late in July may be referred to this species with a fair degree of certainty. Previously known from Southampton Island.

8. **Dupontia Fisheri** R. Brown.

Collected in anthesis during the third week in July. For a discussion of this and related forms see Rept. Can. Arct. Exp., V. Pt. B, pp. 8-9 (1922).

9. **Arctophila fulva** (Trinius) Ruprecht.

Colpodium fulvum (Trinius) Grisebach.

Specimens with young spikelets collected in late July and early August. See Rept. Can. Arct. Exp., V. Pt. B, pp. 6-8 (1922), for a treatment of this and related forms.

10. **Elymus arenarius** Linnæus, var. **villosus** E. Meyer.

The specimens of this plant nearly all have very short culms (1-3 dm.) and well-developed root-stocks. Collections were made at Southampton Island in the second and third weeks of July and on Aug. 2. The species was also collected at Bear Island on Aug. 4, and at Chesterfield Inlet in August and September. For treatments of its identity and geographic range, see Rhodora, XVII, 98 (1915) and XXXII, 201, 203 (1930). Previously known from Southampton Island.

11. **Trisetum spicatum** (Linnæus) Richter.

Trisetum subspicatum Beauvois.

Specimens of this species, with both young and well-developed inflorescences, were collected July 10 and 22. They appear to be identical with the alpine plant of Europe rather than with American varieties of it. See Rhodora, XVIII, 195-8 (1916).

12. **Arctagrostis latifolia** (R. Brown) Grisebach.

Colpodium latifolium R. Brown.

Collected in flower on Southampton Island during the last third of July and the first week in August, and at Chesterfield Inlet in August and September. Previously known from Southampton Island.

13. **Alopecurus alpinus** Smith.

Flowering specimens, in anthesis, collected during most of July and early in August. Previously known from Southampton Island.

14. **Hierochloë alpina** (Liljeblad) R. & S.

Savastana alpina (Liljeblad) Scribner.

Specimens in anthesis collected on Southampton Island the second week in July, on dry ridges. Fruiting culms were found there July 25, and Aug. 2, and at Chesterfield Inlet in August and September. Previously known from Southampton Island.

Family CYPERACEÆ.

15. *Eriophorum Scheuchzeri* Hoppe.

A flowering specimen collected July 17, and one in fruit, August 5. Previously known from Southampton Island.

16. *Eriophorum callitrix* Chamisso.

Fruiting specimens of this, collected the first week in August, appear to be a good match for the Asiatic species. See Rhodora, XXVII, 203-10 (1925), for a discussion of this and its American affinities.

17. *Eriophorum angustifolium* Roth.

Eriophorum polystachyon Linnaeus, in part.

Collected in flower during most of July and with very young fruit early in August. Previously known from Southampton Island.

18. *Kobresia simpliciuscula* (Wahlenberg) Mackenzie.

Carex bipartita Dalla Torre, not Allione.

A single specimen of this, with young fruit, was collected at Chesterfield Inlet in late summer. See N. Am. Flora, XVIII, 6 (1931), for the synonymy of this species.

19. *Carex ursina* Dewey.

Flowering specimens collected July 18 and 19.

20. *Carex rupestris* Allione.

Specimens collected on July 19 and August 5 were in fruiting condition.

21. *Carex scirpoidea* Michaux.

Only the male plants of this dioecious species were collected. They were found in anthesis on July 30. Previously known from Southampton Island.

22. *Carex ustulata* Wahlenberg.

Carex atrofusca of recent authors, but according to Simmons not of Schkuhr.

Collected in flower on Southampton Island on August 5, and with maturing achenes at Chesterfield Inlet in late summer. See Simmons, *Phytogeography, etc.*, p. 63 (1913).

23. *Carex misandra* R. Brown.

Carex fuliginosa Schkuhr, var. *misandra* (R. Brown) O. F. Lang.

Collected in flower during the latter third of July, and in early fruit during the first week in August. See Das Pflanzenreich, IV, 20, p. 557 (1909), and Simmons, *Phytogeography, etc.*, pp. 63-4 (1913) for treatments of this form. Previously known from Southampton Island.

24. *Carex aquatilis* Wahlenberg, var. *stans* (Drejer) Boott.

Carex stans Drejer.

Judging by the abundance of the specimens collected, and by the notes of other travellers in the American Arctic, this is the commonest *Carex* in the region. It was found in flower during the last third of July, and in early fruit during the first week in August. Previously known from Southampton Island.

25. *Carex saxatilis* Linnæus.

A single specimen, in flower, was collected at Chesterfield Inlet in late summer.

26. *Carex membranacea* Bailey.

Carex membranacea Hooker; *C. compacta* R. Brown.

Specimens with very young spikes or early flowers collected during the second and third weeks of July. Those collected during the first week of August at Southampton Island had young fruit, while those collected in late summer at Chesterfield Inlet had maturing fruit. The stoloniferous habit is much accentuated. Previously known from Southampton Island.

Family JUNCACEÆ.

27. *Luzula confusa* Lindeberg.

Luzula arcuata (Wahlenberg) Swartz, var. *confusa* (Lindeberg) Kjellman.

Specimens in late flower or early fruit collected the first week in August. Previously known from Southampton Island.

28. *Juncus arcticus* Willdenow.

Specimens collected during the third week in July have a few mature capsules, but most are in flower.

29. *Juncus biglumis* Linnæus.

Collected in flower during the third week in July.

30. *Juncus castaneus* Smith.

A single specimen in late flower collected at Chesterfield Inlet in the latter part of the summer.

Family LILIACEÆ.

31. *Tofieldia palustris* Hudson.

Tofieldia minima (Hill) Druce.

Flowering specimens were collected during the last week of July and the first week of August.

Family SALICACEÆ.

32. *Salix reticulata* Linnæus.

Only staminate plants were collected, and these during the first three weeks of July. See Bot. Gaz. LXVII, 44, 45 (1919), and Rhodora, XXXII, 200, 202 (1930), for synonymy and range.

33. *Salix herbacea* Linnæus.

A single specimen, with mature capsules, collected at Chesterfield Inlet in late summer.

34. *Salix anglorum* Chamisso.

Salix arctica R. Brown.

Young catkins of this species were collected during the last week of June and the first third of July, while immature capsules were found on July 20. At Chesterfield Inlet, in late summer, a specimen with mature capsules was collected. The plants are all small shrubs up to a foot high. See Bot. Gaz., LXVI, 126-35 (1918), and Journ. Arnold Arb. III, 67 (1921), for synonymy and relationships. Previously known from Southampton Island.

35. *Salix cordifolia* Pursh, var. *callicarpæa* (Trautvetter) Fernald.

A sterile specimen of this species, with well-developed leaves, was collected July 10, and a fertile one with ripening capsules on August 2. For a recent treatment, see Rhodora, XXVIII, 181-8 (1926).

36. *Salix Richardsonii* Hooker.

Specimens with staminate catkins and newly opened leaf buds collected June 26, and a single leafy specimen with an old pistillate catkin found August 3. See Journ. Arnold Arb. I, 214-15 (1920).

37. *Salix alaxensis* (Andersson) Coville

A sterile specimen with young leaves was collected on June 30, and another with maturing capsules on July 23. See Journ. Arnold Arb. I, 223-6 (1920); III, 75 (1921); and Rhodora, XXXII, 200, 202 (1930), for recent treatments of the relationships and range of this species.

Family POLYGONACEÆ.

38. *Oxyria digyna* (Linnæus) Hill.

Several flowering specimens were collected during the first three weeks of July.

39. *Polygonum viviparum* Linnæus.

Bistorta vivipara (Linnæus) S. F. Gray.

Specimens with flowers or well-developed bulblets were found on Southampton Island during the latter half of July, and at Chesterfield Inlet in late summer.

Family CARYOPHYLLACEÆ.

40. *Silene acaulis* Linnæus, var. *excapa* (Allioni) DC.

Found in flower, July 5. See Rhodora, XXIII, 119-20 (1921), for a discussion of this and related forms.

41. *Lychnis furcata* (Rafinesque) Fernald.

Lychnis or *Melandrium affine* of authors.

Collected in flower about mid-July. See Rhodora, XXXIV, 22-25 (1932), for a recent revision of this group.

42. *Lychnis apetala* Linnæus.

Melandrium apetalum (Linnæus) Fenzl.

Flowering specimens were found throughout the latter half of July, and some with young fruit, August 1. All have blue flowers except a few "creamy white" ones collected July 19, in "precisely the same sort of place as that in which the blue ones grow." Previously known from Southampton Island.

43. *Cerastium alpinum* Linnæus, var. *legitimatum* Lindblom.

Specimens with flowers were collected at Southampton Island throughout July, and and some with fruit as early as July 6. Sterile plants were found at Bear Island on August 4, and fruiting ones at Chesterfield Inlet in late August and September. See Rhodora, XXII, 169-79 (1920), for a revision of this section of *Cerastium*. Previously known from Southampton Island.

44. *Cerastium cerastioides* (Linnæus) Britton.

Flowering specimens collected July 20.

45. *Arenaria peploides* Linnæus.

Honkenya peploides (Linnæus) Ehrhart; *Halianthus peploides* (Linnæus) Fries.

Specimens collected during the last two weeks of July are in flower.

46. *Arenaria verna* Linnæus, var. *pubescens* (Chamisso & Schlechtendahl) Fernald.

Arenaria propinqua Richardson.

A single flowering specimen collected August 2. See Rhodora, VIII, 32 (1906), and XXI, 21 (1919). Previously known from Southampton Island.

47. *Arenaria uliginosa* Schleicher.

A single sheet of specimens collected July 20, in flower.

48. *Stellaria longipes* Goldie.

Flowering specimens collected late in June and throughout most of July. Previously known from Southampton Island.

Family RANUNCULACEÆ.

49. *Ranunculus hyperboreus* Rottboell.

There is an undated flowering specimen from Southampton Island, and a sterile one (?) collected at Chesterfield Inlet in late summer.

50. *Ranunculus sulphureus* Solander.

Specimens with late flowers and nearly mature fruits found at Bear Island, August 4. See Rept. Can. Arct. Exp., V. Pt. B, pp. 32-3 (1922), for a study of the relationships of this plant to *R. nivalis* Linnæus, which is closely related to it and with which it is commonly confused.

51. *Ranunculus pygmæus* Wahlenberg.

A single flowering specimen collected July 17.

52. *Ranunculus pedatifidus* J. E. Smith, var. *leiocarpus* (Trautvetter) Fernald.

Flowering plants collected July 7, in "damp places in uplands," and again on July 17. Specimens with immature achenes found at Bear Island August 4. See *Rhodora*, XXXVII, 93-96, (1934).

Family PAPAVERACEÆ.

53. *Papaver radiculatum* Rottboell.

Papaver nudicaule of authors.

Found in flower through most of July, the specimens collected late in the month being with immature capsules. Previously known from Southampton Island.

Family CRUCIFERÆ.

54. *Cochlearia grœnlandica* Linnæus.

Cochlearia officinalis Linnæus, var. *grœnlandica* (Linnæus) Gellerstedt, in Andersson & Hesselbo.

Found in flower throughout most of July, and with immature fruits during the latter half. Specimens collected at Bear Island, August 4, have nearly mature pods.

55. *Eutrema Edwardsii* R. Brown.

Collected with flowers and immature fruit during most of July, and with maturing fruit during the last third of the month. Found with flowers and immature fruit at Bear Island, August 4. Its habitat is noted as "damp places in uplands." Previously known from Southampton Island.

56. *Cardamine bellidifolia* Linnæus.

Found in flower July 4, and with maturing fruit, July 18.

57. *Cardamine pratensis* Linnaeus, var. *angustifolia* Hooker.

Collected in flower during the latter half of July. A specimen found July 17 is marked "Prairie Point." See Rhodora, XXII, 9-11 (1920), for a revision of this group. Previously known from Southampton Island.

58. *Lesquerella arctica* (Richardson) Watson.

Flowering specimens collected July 5. Previously known from Southampton Island.

59. *Draba alpina* Linnaeus.

Found in flower from about mid-July to the first week of August. Maturing pods were collected early in August at Bear Island. See Contrib. Gray Herb., CV (1934), for discussions of this and the following species of *Draba*.

60. *Draba alpina* Linnaeus, var. *nana* Hooker.

Found flowering in late June and early July. Maturing pods collected during the first week in August.

61. *Draba fladnizensis* Wulfen.

Found in flower the first week in July. A flowering specimen collected July 20 has also been doubtfully referred to this species.

62. *Draba nivalis* Liljeblad.

Found in flower and immature fruit during the second and third weeks of July.

63. *Draba glabella* Pursh.

In flower during most of July, and with maturing fruit in the last third of the month. Previously known from Southampton Island.

64. *Draba cinerea* Adams.

Flowering specimens found the first week in July.

65. *Braya purpurascens* (R. Brown) Bunge.

Flowering specimens collected late in June and during the first three weeks in July.

Family SAXIFRAGACEÆ.

66. *Saxifraga rivularis* Linnaeus.

A single specimen, in late flower, found at Chesterfield Inlet in late summer.

67. *Saxifraga cernua* Linnaeus.

Found with flowers and developing bulblets during the third week in July.

68. *Saxifraga cernua* Linnæus, var. *latibracteata* Fernald & Weatherby.

Flowering specimens collected during the latter half of July. See *Rhodora*, XXXIII, 234-5 (1931).

69. *Saxifraga sileniflora* Sternberg.

Muscaria sileniflora (Sternberg) Small.

In flower during the third week in July.

70. *Saxifraga nivalis* Linnæus.

Micranthes nivalis (Linnæus) Small.

Collected in flower early in July, and with both flowers and immature fruit in the latter half of the month.

71. *Saxifraga tricuspidata* Rottboell.

Leptasea tricuspidata (Rottboell) Haworth.

Collected with flowers and immature capsules at Southampton Island during the first three weeks of July, and with mature fruit at Chesterfield Inlet in August and September. Previously known from Southampton Island.

72. *Saxifraga aizoides* Linnæus.

Leptasea aizoides (Linnæus) Haworth.

Plants with flowers and immature fruit collected in the last third of July and the first week in August. Previously known from Southampton Island.

73. *Saxifraga Hirculus* Linnæus.

Leptasea Hirculus (Linnæus) Small.

Collected in flower at Southampton Island throughout most of July, and at Chesterfield Inlet in August and September. Previously known from Southampton Island.

74. *Saxifraga oppositifolia* Linnæus.

Antiphylla oppositifolia (Linnæus) Fourreau.

Found in flower from June 16 to July 4, and noted by the collector as the first species to blossom in the spring. Immature fruit found early in July.

75. *Chrysosplenium tetrandrum* Fries.

Chrysosplenium alternifolium Linnæus, var. *tetrandrum* (Fries) Lundström.

Collected with maturing fruit during the latter half of July and the first week in August.

Family ROSACEÆ.

76. *Potentilla nivea* Linnæus, var. *subquinata* Lange.

Potentilla subquinata (Lange) Rydberg; *P. nipharga* Rydberg.

Found with flowers and maturing fruit in late June and the latter part of July.

77. *Potentilla Vahlia* Lehmann.

Found with flowers, June 27, and with both flowers and mature fruit, July 4. Previously known from Southampton Island.

78. *Dryas integrifolia* Vahl.

Collected in flower during most of July at Southampton Island, and in fruit at Chesterfield Inlet late in the summer. Noted by the collector as "ubiquitous save in marshes." Previously known from Southampton Island.

Family LEGUMINOSÆ.

79. *Astragalus alpinus* Linnæus.

Tium alpinum (Linnæus) Rydberg.

Collected in flower at Southampton Island during the second and third weeks of July, and in flower at Chesterfield Inlet in late summer.

80. *Oxytropis hudsonica* (Greene) Fernald.

Flowering specimens collected during the last three weeks of July. Its habitat is noted as "gravel ridges." For a discussion of this and the following species of *Oxytropis* see Rhodora, XXX, 137-55 (1928).

81. *Oxytropis Maydelliana* Trautvetter.

Oxytropis leucantha Gray, in part; *O. campestris* (Linnæus) De Candolle, var. *melanocephala* Hooker.

Found in flower during the second and third weeks of July. Habitats noted are, "Uplands," and "Sandy and gravelly ridges." Previously known from Southampton Island.

82. *Oxytropis arctobia* Bunge.

Collected in flower during late June and early July, and in fruit late in July. Its habitat is noted as "upper ridges in gravel."

83. *Oxytropis Belli* (Britton) Palibine.

A single specimen, in fruit, collected at Chesterfield Inlet in late summer.

Family EMPETRACEÆ.

84. *Empetrum nigrum* Linnæus.

A single fruiting specimen collected July 23.

Family ONAGRACEÆ.

85. *Epilobium latifolium* Linnæus.

Chamaenerion latifolium (Linnæus) Sweet.

Collected in flower during the third week in July.

86. *Epilobium alpinum* Linnæus.

Flowering specimens collected July 25. See Rhodora, XI, 141-7 (1909); XX, 36-8 (1918); and Bot. Exch. Club, Brit. Isles, III, Pt. 5, p. 438 (1913), for treatments of this species.

Family HIPPURIDACEÆ.

87. *Hippuris vulgaris* Linnæus.

A flowering specimen collected July 18, and a sterile one on August 2.

Family PYROLACEÆ.

88. *Pyrola grandiflora* Radius.

Pyrola rotundifolia Linnæus, var. *pumila* Hooker.

Flowering specimens collected during the latter half of July and the first week of August.

Family ERICACEÆ.

89. *Ledum palustre* Linnæus, var. *decumbens* Aiton.

Ledum decumbens Loddiges ex Steudel.

Found in flower at Southampton Island, July 30, and with late flowers and immature fruit at Chesterfield Inlet late in the summer. For a recent treatment of this and related forms, see Meddel. Grønl. LVIII, Pt. 1, 118-32 (1926), in which it is maintained that the above variety is worthy of specific rank.

90. *Rhododendron lapponicum* Linnæus.

Collected in flower during the latter two thirds of July.

91. *Cassiope tetragona* (Linnæus) Don.

Plants with both flowers and maturing fruits collected July 6 and 10. Their habitat is noted as "mossy tundra." Previously known from Southampton Island.

92. *Arctostaphylos rubra* (Rehder & Wilson) Fernald.

Arctostaphylos alpina (red-fruited form) Richardson; *Mairania alpina* (red-fruited form) Britton & Rydberg; *Arctous* (Gray) Niedenzu.

Found in flower during the last week in June and the first third of July. Other specimens, collected later in July, are sterile. The habitat is noted as "mossy tundra." See Rhodora, XVI, 32 (1914).

93. *Vaccinium uliginosum* Linnæus, var. *alpinum* Bigelow.

Flowering plants found late in June at Southampton Island, and fruiting ones at Chesterfield Inlet in August and September. See Rhodora, XXV, 23-5 (1923), for a discussion of this form.

94. **Vaccinium Vitis-Idæa** Linnæus, var. **minus** Loddiges.

Vitis-Idæa Vitis-Idæa (Linnæus) Britton.

Flowering specimens collected during the latter half of July and early in August.

Family PLUMBAGINACEÆ.

95. **Statice labradorica** (Wallroth) Hubbard & Blake, var. **genuina** Blake.

Statice Armeria of authors.

Flowering specimens collected in the third and fourth weeks of July. See *Rhodora*, XIX, 1-9 (1917).

Family BORAGINACEÆ.

96. **Mertensia maritima** (Linnæus) S. F. Gray.

Collected in flower on July 20.

Family SCROPHULARIACEÆ.

97. **Castilleja pallida** (Linnæus) Sprengel, subsp. **elegans** (Ostenfeld) Pennell.

Flowering specimens collected at Chesterfield Inlet in late summer. See *Proc. Acad. Nat. Sci. Phila.* LXXXVI, 522-528 (1934).

98. **Pedicularis lapponica** Linnæus.

Collected in flower on July 23.

99. **Pedicularis sudetica** Willdenow.

Found flowering in the latter half of July and early in August. Previously known from Southampton Island.

100. **Pedicularis lanata** Chamisso & Schlechtendahl.

Collected in flower, July 3 and 10, and recorded as "one of the earliest flowers to appear." Its habitat is noted as "gravel ridges."

101. **Pedicularis hirsuta** Linnæus.

Found flowering in the latter half of July.

102. **Pedicularis flammea** Linnæus.

Collected in flower, July 19 and 20.

103. **Pedicularis capitata** Adams.

Flowers collected during the latter half of July and early in August. Previously known from Southampton Island.

Family CAMPANULACEÆ.

104. *Campanula uniflora* Linnæus.

Collected in flower from July 18 to 30. The specimen collected on July 18 is marked, "Upper dry grass country. Rare." Previously known from Southampton Island.

Family COMPOSITÆ.

105. *Erigeron eriocephalus* J. Vahl.

Found at Southampton Island, July 19, with flowers and maturing achenes, and at Chesterfield Inlet in late summer with both flowers and disseminated achenes.

106. *Matricaria grandiflora* (Hooker) Britton.

Matricaria inodora Linnæus, var. *grandiflora* (Hooker) Ostenfeld.

Collected in flower, July 19.

107. *Chrysanthemum integrifolium* Richardson.

Found flowering in the latter half of July and early in August. Its habitat is noted as "uplands—not on the beach where the big ones grow." The latter are obviously of the preceding species. Previously known from Southampton Island.

108. *Senecio palustris* (Linnæus) Hooker.

Collected in flower during the second week in July.

109. *Taraxacum lacerum* Greene.

Found in flower July 19 and August 2. See *Rhodora*, XXXV, 378-379 (1933).

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